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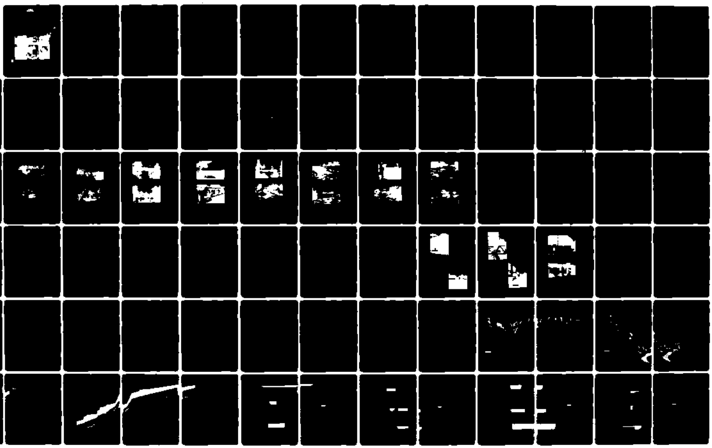

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# FLOOD PLAIN INFORMATION

# ELLICOTT CREEK

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IN THE TOWNS OF

# LANCASTER & ALDEN

AND IN THE VILLAGE OF

# ALDEN

ERIE COUNTY, NEW YORK

AD A







PREPARED FOR
NEW YORK STATE DEPARTMENT OF
ENVIRONMENTAL CONSERVATION
DIVISION OF WATER RESOURCES

By

CORPS OF ENGINEERS, U. S. ARMY
BUFFALO DISTRICT
OCTOBER

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This reprot is based on hydrological facts, historical, and recent flood heights, and other technical data bearing upon the occurrence and magnitude of floods in the Ellicott Creek area. Included in this reprot are maps, profiles cross sections and photographs which indicate theextent of flood which might occur in the future. This report is intended to provide tha basis for further study and planning on the part of local governments within the study area in arriving at solutions to minimize possible future flood damages.

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## INTRODUCTION

This flood plain information report on Ellicott Creek, Erie County, New York, has been prepared at the request of the Towns of Lancaster and Alden through the New York State Department of Environmental Conservation. It will be distributed through both of the above governmental agencies.

The study covers approximately 13.8 miles of Ellicott Creek from Stony Road in the Town of Lancaster, upstream to Crittenden Road in the Town of Alden. The lower 5.2 miles of the study area are within the Town of Lancaster, and the remaining 8.6 miles are within the Town and Village of Alden. This report is intended to provide planners and local governments with technical information and data on possible future floods, namely the Intermediate Regional Flood and the Standard Project Flood. Whenever reference is made to the flood plain in this report, it refers to the area which would be inundated by the Standard Project Flood. The Intermediate Regional Flood has a frequency of occurrence in the order of once in 100 years, which means that over a long period of, say, 500 years, the magnitude of this flood would probably be equalled or exceeded about 5 times, or on the average of once in 100 years. The Standard Project Flood is a flood of rare occurrence and, on most streams in this area, is considerably larger than any floods that have occurred in the past. However, it is recommended that possible future floods, including the Standard Project Flood, be considered when development within the flood plain is planned. Using this data as a guide, the planners and local officials have a basis for effective and workable legislation for the control of land use within the flood plain.

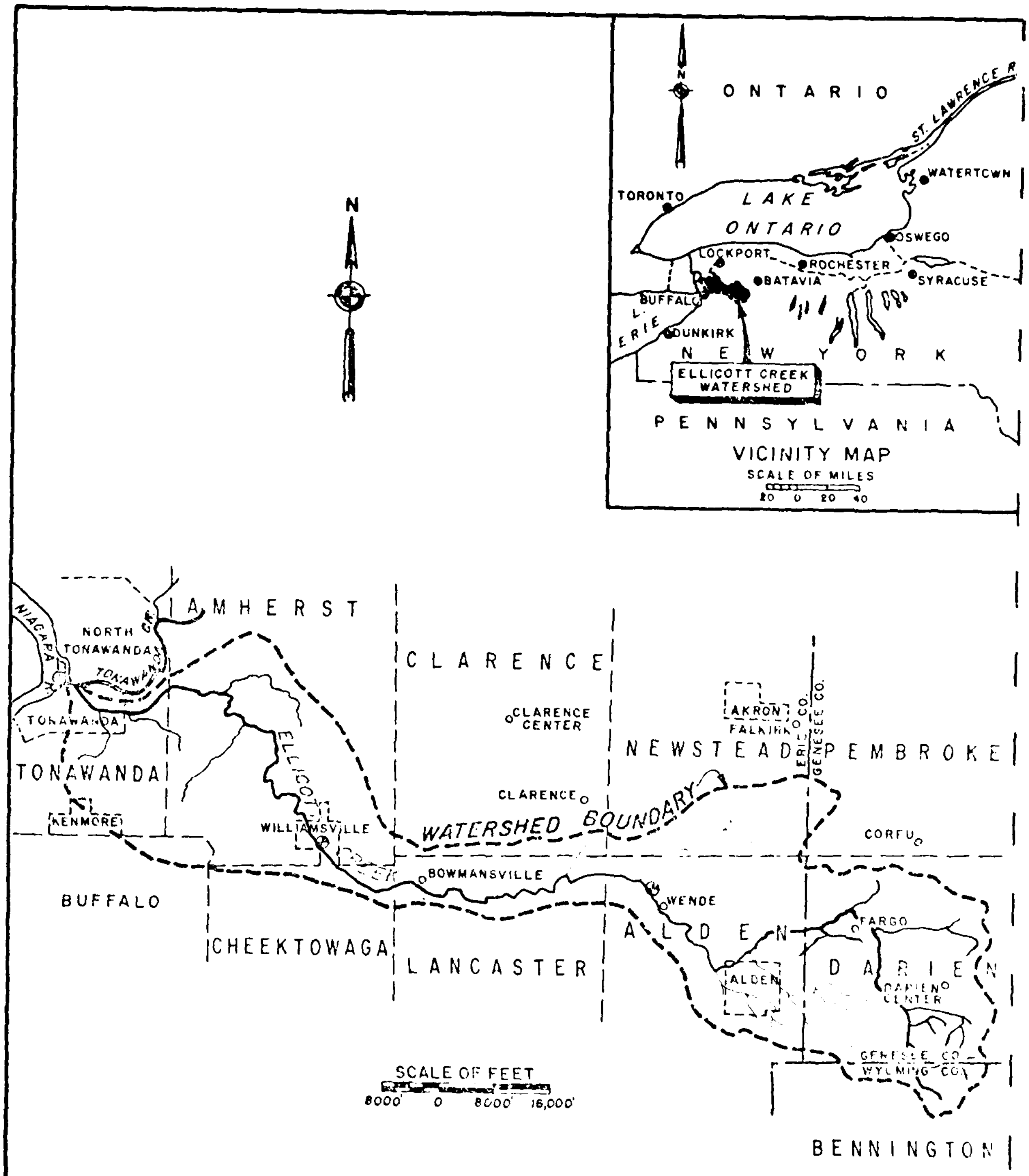
The report is based on hydrological facts, historical and recent flood heights, and other technical data bearing upon the occurrence and magnitude of floods in the Ellicott Creek area.

Included in this report are maps, profiles, cross-sections and photographs which indicate the extent of flooding which might occur in the future. These data, if properly used, can be very beneficial in wise flood plain management. From the maps, profiles and cross sections in this report the depth of possible future flooding at any location by an occurrence of either the Intermediate Regional Flood or the Standard Project Flood may be determined. Based on this information, future construction may be planned high enough to avoid flood damage.

This report does not include plans for the solution of flood problems. Rather, it is intended to provide the basis for further study and planning on the part of local governments within the study area in arriving at solutions to minimize possible future flood damages. This can be accomplished by local planning programs to guide developments by controlling the type of use made of the flood plain through zoning and subdivision regulations. Another means in which local flood plain management can be accomplished is through public acquisition for a low development use such as recreation.

Pamphlets and guides pertaining to flood plain regulations, flood proofing and other related actions have been prepared by the Corps of Engineers. They are made available for use of State, local governments and citizens in planning and taking action to reduce their flood damage potential.

The Buffalo District of the Corps of Engineers will, upon request, provide technical assistance to Federal, State and local agencies in the interpretation and use of the information contained within this report and will provide other available flood data related thereto.




## LEGEND:

SOLID LINE INDICATES REACH COVERED BY THIS STUDY.

U.S.G.S. RECORDING GAGE

ELLICOTT CREEK
ERIE COUNTY, NEW YORK
FLOOD PLAIN INFORMATION REPORT

**BASIN MAP**

U.S. ARMY ENGINEER DISTRICT, BUFFALO
OCTOBER 1972

PLATE 1

## SUMMARY OF FLOOD SITUATION

This flood plain information study covers the inundated areas along Ellicott Creek from Stony Road upstream to Crittenden Road, a distance of 13.8 miles. Within this reach the creek flows through the Town of Lancaster and the Town and Village of Alden, all within Erie County, New York, as shown on plate 1.

There are no automatic water-stage recording stations in operation, on Ellicott Creek in the area which this study covers. However, the United States Geological Survey did maintain a gaging station at Millgrove from March 1963 to September 1968. The highest discharge recorded at this gaging station was 1400 cubic feet per second on March 5, 1964.

Local government officials and residents along the creek have been interviewed to determine high water marks. Newspaper files and historical documents were searched for information concerning past floods. From these data and studies of possible future floods, the local flood situation, both past and future, has been developed. The following paragraphs summarize the significant findings which are discussed in more detail in succeeding sections of this report.

### HISTORICAL FLOODS

Historical documents state that two floods of approximately equal magnitude occurred in the Town of Amherst in March 1916 and January 1929. The frequency of occurrence or recurrence interval of floods of this magnitude is on the average of once in 15 years. There are no records available on these floods within this reach under study.

### THE GREATEST FLOOD

The greatest known flood in the area downstream of this study area occurred 17 March 1936 and it has a frequency of occurrence estimated to be on the average of once in 50 years. Although the 1916 and 1929 flood stages exceeded the 1936 flood at various locations in the Town of Amherst, the 1936 flood is generally considered to be the most damaging flood in that area. No flood elevations are available for the study area in Lancaster and Alden.

ANOTHER GREAT FLOOD

Although there are no recorded or estimated discharges available in the study area for this occurrence, the most severe flood in recent years occurred in March 1960 in the Town of Amherst.

OTHER LARGE FLOODS

The following dates have been recorded in newspaper articles and Corps of Engineers files as additional occurrences of high water and damage in the study area within recent years: June 1937, March 1940, March 1954, March 1956, January 1959, March 1963. Other floods probably occurred previous to 1916 but no definite dates or stages could be established because of the lack of development and records in the area at the time.

INTERMEDIATE REGIONAL FLOOD

The Intermediate Regional Flood has an average frequency of occurrence in the order of once in 100 years. From an analysis of data the computed flood situation is shown on plates 2 and 3 and table 1.

STANDARD PROJECT FLOOD

The Standard Project Flood is produced by the most severe combination of meteorological and hydrological conditions that is considered reasonably characteristic of the drainage basin under study. The water elevation resulting from a flood of this magnitude is considered by the Corps of Engineers to be the upper limit of the flood plain.

## FLOOD DAMAGES

The recurrence of major known discharges such as occurred in the 1916 and 1929 floods would most likely result in substantial damage in the study area. Hurricane Agnes did not affect the Erie-Niagara Basin. The other major flood which occurred in 1960 does not seem to have caused any damage according to a damage survey conducted by a local engineering consultant. An occurrence of the Intermediate Regional Flood or Standard Project Flood in the study area would cause extensive damage because of the ever increasing development within the flood plain, their wider extent, greater depth of flooding and accompanying higher velocities.

## MAIN FLOOD SEASON

The major damaging floods in the Ellicott Creek basin have often been caused by melting snow coincident with moderate amounts of precipitation. Although damaging floods have and can occur at all times of the year, almost all instances of major floods have occurred in the late winter or early spring (January-April). Relatively few damaging floods have been produced by precipitation alone. This is due to the orientation of the basin with respect to the usual direction of travel of frontal systems in this area. In the study area Ellicott Creek flows generally in a west northwesterly direction whereas the frontal systems normally travel from west to east. This was not the case for the June 1937 flood. This flood was the result of an intense rainfall on the already saturated basin. Heavy rainfall was recorded on 17-18 June and again during 20-21 June. A total of 4.26 inches was recorded for this period of which

1.50 inches fell in a three-hour period on June 21. From a study of this storm it appears that the storm center entered the basin from the southwest, then veered easterly and traveled almost parallel to the Ellicott Creek basin.

VELOCITIES OF WATER

During periods of high water, channel velocities vary from about four feet per second at the Foxall bridge to about fifteen feet per second at Pavement Road. During an Intermediate Regional Flood or a Standard Project Flood, velocities would be substantially greater and would be extremely dangerous to life and property. Velocities greater than 3 feet per second combined with depths of 3 feet or greater are generally considered hazardous.

HAZARDOUS CONDITIONS

The larger floods have caused hazards to local residents in many ways. Since almost all of the floods on Ellicott Creek occurred in the late winter and/or early spring, residents may suffer illness and discomfort from lack of heat if basement flooding extinguishes furnace fires. Due to the long duration and extent of flooding, environmental health problems may develop if septic tanks and municipal sewage treatment facilities are taxed above their capabilities, and sediment is deposited on banks and surrounding grounds. Flood waters which cover roads can cause hazardous driving conditions for anyone attempting to drive through the inundated areas. Also, the danger from underestimating the velocity and depth of flood waters by unsuspecting children is an age old problem confronting residents within flooded areas.

## FLOOD DAMAGE PREVENTION MEASURES

In 1959, the Corps of Engineers completed a clearing and snagging project from Niagara Falls Boulevard upstream to the Amherst Sewage Treatment Plant, in the Town of Amherst, at a cost of $75,700. The Buffalo District is presently preparing a report to determine the feasibility of possible flood control measures within the Tonawanda Creek watershed of which Ellicott Creek is a tributary. Considered plans of improvement for flood control include channel improvements and retardation of flood waters by means of a reservoir. At the present time none of the communities have established flood plain regulations. The Sandridge reservoir that is currently being considered would alter the flood plain. But no definite information on this aspect can be predicted as the project is still under investigation.

## FUTURE FLOOD HEIGHTS

Estimated flood crests that would be attained if either the Intermediate Regional Flood or the Standard Project Flood occurred in the study area, along with the fifty year flood are shown in table 1. This table gives a comparison of the Intermediate Regional and Standard Project Floods with the Fifty Year Flood. These data are prepared for the various locations indicated so that future floods can more easily be compared.

TABLE 1

RELATIVE FLOOD HEIGHTS

| Location | Creek Mile | Flood | Est.Peak Discharge | Above * 50-Year Flood (Ft.) |
|---|---|---|---|---|
| Stony Road | 21.75 | 50-Year | 5,500 | 0 |
| | | I.R.F. | 6,350 | 2.42 |
| | | Std.Proj. | 23,800 | 4.78 |
| Pavement Road | 23.11 | 50-Year | 5,264 | 0 |
| | | I.R.F. | 6,080 | 0.29 |
| | | Std.Proj. | 22,482 | 8.57 |
| Foxall Bridge | 25.06 | 50-Year | 4,926 | 0 |
| | | I.R.F. | 5,692 | 0.66 |
| | | Std.Proj. | 20,593 | 9.14 |
| Ransom Road | 25.90 | 50-Year | 4,780 | 0 |
| | | I.R.F. | 5,525 | 0.35 |
| | | Std.Proj. | 19,779 | 7.30 |
| Townline Road | 26.94 | 50-Year | 4,599 | 0 |
| | | I.R.F. | 5,318 | 0.19 |
| | | Std.Proj. | 18,771 | 7.78 |
| Zoeller Road | 27.78 | 50-Year | 4,454 | 0 |
| | | I.R.F. | 5,151 | 0.30 |
| | | Std.Proj. | 17,957 | 6.82 |
| Home Road | 28.59 | 50-Year | 4,313 | 0 |
| | | I.R.F. | 4,990 | 0.60 |
| | | Std.Proj. | 17,173 | 9.76 |
| Walden Avenue | 29.24 | 50-Year | 4,200 | 0 |
| | | I.R.F. | 4,861 | 0.39 |
| | | Std.Proj. | 16,543 | 8.42 |
| Penn Central Railroad | 29.72 | 50-Year | 4,117 | 0 |
| | | I.R.F. | 4,765 | 0.62 |
| | | Std.Proj. | 16,078 | 8.16 |
| Farm Road | 29.94 | 50-Year | 4,079 | 0 |
| | | I.R.F. | 4,721 | 0.65 |
| | | Std.Proj. | 15,865 | 13.42 |
| Lehigh Valley | 30.43 | 50-Year | 3,994 | 0 |
| | | I.R.F. | 4,624 | 0.61 |
| | | Std.Proj. | 15,390 | 11.75 |
| Sandridge Road | 32.26 | 50-Year | 3,676 | 0 |
| | | I.R.F. | 4,260 | 0.87 |
| | | Std.Proj. | 13,617 | 11.44 |
| Crittenden Road | 35.58 | 50-Year | 3,100 | 0 |
| | | I.R.F. | 3,600 | 0.48 |
| | | Std.Proj. | 10,400 | 6.45 |

* These elevations refer to upstream side of the bridge

## GENERAL CONDITIONS AND PAST FLOODS

### GENERAL

This section of the report is a history of floods on Ellicott Creek, in Erie County, New York. The study area covers the reach from Stony Road, Town of Lancaster, 21.8 miles upstream to Crittenden Road, in the Town of Alden, creek mile 35.6, a distance of 13.8 miles. Plates 1, 2, and 3 of this report show the geographical orientation of Ellicott Creek.

Ellicott Creek flows generally from east to west by northwest following a meandering course through a moderate flood plain for most of this study area.

A major portion of the residential and commercial properties located in close proximity to the creek suffer flood damage frequently. Although a portion of the flood plain has been inundated by floods of the past, floods such as the Intermediate Regional and Standard Project would cause an extremely large amount of damage in areas which have never before been subjected to flooding.

A search of the flood history on Ellicott Creek has indicated frequent and extensive damage in the past and indicates damage will continue to increase because of the continuing development within the flood plain. Much of the flood data given in this report are based on reconnaissance made during or shortly after high water periods and on a survey by Buffalo District personnel in the summer of 1972 which was conducted to determine damages within most of the study area. During the survey local residents were interviewed and information was gathered pertaining to water elevations for various floods, damages suffered in the past and damage that could be expected during a recurrence of past flood flows or potential floods of greater magnitude. A search was also made of newspaper files, historical documents, gage records and other miscellaneous sources enabling a history of known floods to be developed for the area being studied.

Settlement

Large scale settlement in the area of New York State occupied by the Lake Erie-Niagara River drainage basin was delayed until after 1797 by the presence of the Seneca Indians, who were the last hold-outs of the once powerful Iroquois Confederacy. By 1797 all basin land had been purchased except for a few small areas which the Senecas held for themselves. The Holland Land Company acquired lands in the basin and began land sales in 1801. The manager of the Holland Land Company laid out the basic system of roads and founded many towns including Buffalo. Despite the military activities along the Niagara Frontier during the war of 1812, the population of the Holland Project grew rapidly and had reached about 100,000 persons by 1821, most of which were in the Lake Erie-Niagara River drainage basin.

The Erie Canal was opened to Buffalo in 1925 and the subsequent development of the northwestern portion of the basin was rapid. Buffalo became the great port of transfer for immigrants and manufactured goods from canal barge to lake vessel and of grain and other bulky produce from lake vessel to canal barge. By 1850, when the railroad reached the lake shore, Buffalo and its surroundings were well on the way to becoming a leading industrial area. During the subsequent period of industrial growth, general farming practices gave way to more specialized activities such as truck gardening, fruit growing and dairying.

There has been no change in the geographical boundaries of townships within Frie County since 1857, except for the

City of Lackawanna which was incorporated in 1909 from the Town of West Seneca. The following is a list of formation dates of Erie County and political subdivisions within the study area.

a. Erie County - As far as can be determined, this county was originally in the possession of the Kahquath Indian Tribe. It was the 53rd county formed in the state and was created on 2 April 1821 from Niagara County. Its name was derived from the tribe of Indians living in that area prior to 1654.

b. City of Tonawanda - Incorporated in 1903.

c. Town of Tonawanda - Formed from Buffalo 16 April 1836.

d. Village of Williamsville - Incorporated in 1869.

e. Town of Amherst - Formed from Buffalo 10 April 1818, which included part of Cheektowaga at that time.

f. Town of Cheektowaga - Formed from Amherst 2 March 1839.

g. Town of Lancaster - Formed from Clarence 22 March 1833, part of West Seneca taken off in 1851 and part of Elma taken off in 1857.

h. Town of Alden - Formed from Town of Clarence 27 March 1823.

i. Village of Alden - Incorporated in 1869.

Population

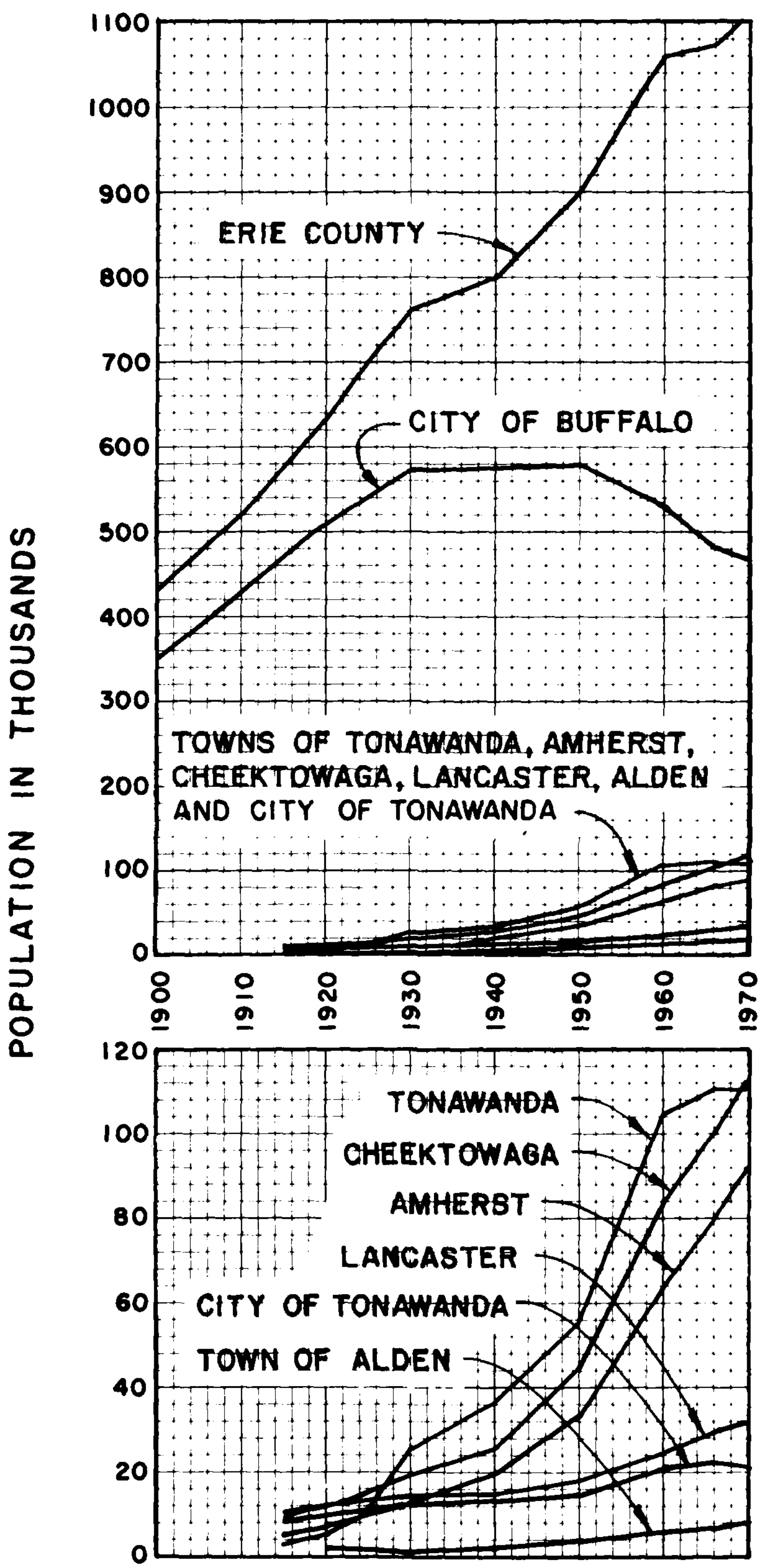
The United States Bureau of Census figures for 1970 show the population of the City of Buffalo has descreased from 532,759 in April 1960 to 462,768 in April of 1970, a drop of 13.14 percent in 10 years. During this same period the population of Erie County has increased from 1,064,688 in April 1960 to 1,113,491 in April, 1970, an increase of 4.6 percent. Also during this period, the population of the communities in the study area has increased 21.35 per cent, the largest increase being downstream, (49.5 percent) in the Town of Amherst. This trend of population moving from Buffalo to the suburbs started early in the 1950's and is expected to continue. Figure 1 exemplifies the population trends for Erie County and the City of Buffalo from 1900 to the present. Also shown are the population trends for the communities in the study area from 1915 to the present.

During the period from 1920 to 1970 the estimated population of the Ellicott Creek drainage basin in Erie County has increased from 19,014 to 153,244 representing an increase of approximately 800 percent for the 50 year period. Table 2 shows the estimated increase in population for each community within the flood plain for the period 1920 through 1970.

The net result of the population trends within Erie County shows a definite direction of increased development within the flood plain. Unless proper Flood Plain Management is instituted and enforced as soon as possible, this increase in development of the flood plain, if allowed to continue without regard for flooding at the rate it has in the past, will lead to more frequent and greater depth of flooding, and considerably increase the amount of damage for its inhabitants.

## Flood Damage Prevention Measures

The Ellicott Creek basin was studied in regard to flood control by the Buffalo District in a survey which was submitted to Congress in 1939. Although at the time available data indicated that flood protection on Ellicott Creek was feasible, the annual costs of such protection exceeded the anticipated annual benefits in such proportion as not to justify further investigation of a local protection project for the basin.




POPULATION TRENDS



FIGURE 1

TABLE 2 - ESTIMATED POPULATION IN STUDY AREA

Erie County, New York

| Name of Community | Estimated percent of Community in Ellicott Creek Basin | * | 1920 | 1930 | 1940 | 1950 | 1960 | 1966 | 1970 | Percent Increase 1960 to 1970 |
|---|---|---|---|---|---|---|---|---|---|---|
| City of Tonawanda | 47 | A | 10,068 | 12,681 | 13,008 | 14,617 | 21,561 | 21,946 | 21,898 | 1.6 |
| | | B | 4,732 | 5,960 | 6,114 | 6,870 | 10,134 | 10,315 | 10,292 | |
| Town of Tonawanda | 57 | A | 5,505 | 25,006 | 32,155 | 55,270 | 105,032 | 109,702 | 107,282 | 2.1 |
| | | B | 3,138 | 14,253 | 18,328 | 31,504 | 59,868 | 62,530 | 61,150 | |
| Town of Amherst | 56 | A | 6,286 | 13,181 | 19,400 | 33,744 | 62,837 | 79,147 | 93,929 | 49.5 |
| | | B | 3,520 | 7,381 | 10,864 | 18,897 | 35,189 | 44,322 | 52,600 | |
| Town of Cheektowaga | 11 | A | 11,923 | 20,849 | 25,006 | 45,354 | 84,056 | 101,017 | 113,844 | 35.4 |
| | | B | 1,312 | 2,293 | 2,751 | 4,989 | 9,246 | 11,112 | 12,523 | |
| Town of Lancaster | 34 | A | 13,172 | 15,260 | 15,300 | 18,470 | 25,605 | 29,510 | 30,634 | 19.6 |
| | | B | 4,478 | 5,188 | 5,202 | 6,280 | 8,706 | 10,054 | 10,415 | |
| Town of Alden | 64 | A | 2,866 | 2,433 | 4,463 | 4,613 | 4,899 | 7,615 | 9,787 | 28.5 |
| | | B | 1,834 | 1,557 | 2,856 | 2,952 | 3,125 | 4,874 | 6,264 | |
| Erie County | | A | 634,688 | 762,408 | 798,377 | 899,238 | 1,064,688 | -- | 1,113,491 | 4.6 |
| | | B | 19,014 | 36,632 | 46,115 | 71,492 | 126,278 | 143,207 | 153,244 | |

* A - Total population for each community.

B - Estimated population within the Ellicott Creek Basin, assuming population is evenly distributed throughout each community.

At the present time the Buffalo District is engaged in a study entitled "Review of Reports for Flood Control and Allied Purposes on Fllicott Creek. Possible flood control measures being considered on Ellicott Creek are channel improvements, levees, and a reservoir. The results pertaining to justification of these plans of improvement along with recommendations have been submitted to Congress early in 1970. Because justification for improvements is unknown at the present time and actual construction of flood prevention measures, if found to be economically feasible, would take several years. As part of the local cooperation for the proposed project it is required that local communities develop and enforce flood plain regulations. It should be understood that flood control projects can not provide complete protection. They protect only against flooding up to a degree found to be the most economically justified, which is the basis for design purposes.

Existing Regulations

Present regulations for the communities within the study area do not have specific provisions to regulate building within the flood plain, or regulate the use of land with respect fo flood risk, although development within known flooded areas is usually discouraged by local governments.

Although zoning regulations have been in effect for the communities within this study area for a number of years, there are no provisions which regulate the use of land with respect to flood risk. However, the State of New York enabling statutes which permit city zoning, specify in Chapter 21, Article 2-A, Section 24, that "such regulations shall be designed to secure safety from fire, floods and other dangers, and to promote the public health and welfare..." The State of New York Town Law, Section 263, states "such regulations shall be made in accordance with comprehensive plan and design to lessen congestion in the streets to secure safety from fire, floods, panic and other dangers to promote health and general welfare...." Also, Section 277 concerning planning boards and official maps, states that "land shown on such plats shall be of such a character that it can be used safely for building purposes without danger to health or peril from fire, flood or other menace."

The 1965 Legislature of New York State passed amendments adding Part IIIA, Use and Protection of Waters, to Article 5 of the Conservation Law. Although Part IIIA is not meant to regulate the flood plain, it does help prevent encroachment of streams, thereby helping to reduce future flood damages. Part IIIA states, in part, that no person or public corporation shall change, modify or disturb the course, channel or bed of any stream or shall erect, reconstruct or repair any dam or impoundment structure without a permit from the Water Resources Commission. The amendments became effective on 1 January 1966. The full text of the Act can be found in Chapter 955 Sections 429 a-g of the Laws of New York State - 1965.

Flood Warning and Forecasting Services

At present there is no specific flood warning or forecasting service for the Ellicott Creek basin. The study area, however, is well within the effective range of the Weather Surveillance Radar operating continuously by National Oceanographic and Atmospheric Administration at the Buffalo Airport Station. This equipment provides for the early detection and plotting of heavy precipitation and makes possible immediate radio and television broadcasts of information concerning the predicted path and amount of rainfall from the storm.

Snow surveys taken periodically during the winter months also provide basic data for flood predictions. They are conducted on a state wide basis in accordance with a schedule set by the United States Geological Survey in Albany.

These snow survey data are published monthly or periodically in the "New York Cooperative Snow Survey Bulletin" and in addition personnel of the Buffalo District, Corps of Engineers analyze the data in regard to flood potential.

At the present time, none of the communities within the study area have a definite plan for flood fighting and/or evacuation. Although residents within the study area usually can be alerted to a possible flood situation, accurate forecasting of the timing and stages of flood peaks is difficult on a drainage area as small as Ellicott Creek.

Observations made through coordination of communities upstream of the study area along with observations made at existing and proposed gage locations within the study area would provide an indication of the timing and relative severity of a flooding situation. It is also suggested that reference points also be established at Stony Road bridge, mile 21.8, and Crittenden, 35.6. These observations will provide flood warning to residents within the affected area. Although the anticipated flood may be of moderate proportions, forewarning permits public utilities, highway departments and property owners to set up warning and detours and to reduce flood damage as much as possible.

A survey of the communities within the study area showed that no formal flood warning program exists. However, surveillance of Ellicott Creek and its tributaries is maintained by Highway Departments, Local Police Departments and State and County law enforcement agencies.

The Stream and its Valley

Ellicott Creek is the largest tributary of Tonawanda Creek and drains an area of approximately 110 square miles in Erie, Genesee and Wyoming Counties. Its source is about 22 miles easterly of Buffalo, at an elevation of about 1,300 feet above mean sea level. It flows in a northwesterly direction into the canalized section of Tonawanda Creek at an elevation of about 564 feet. There are three named tributaries to Ellicott Creek: Elevenmile Creek - drainage area 10.4 square miles; Crooked Creek - drainage area 6.1 square miles; and, Spring Creek - drainage area 6.1 square miles. The topography of the watershed varies from flat lands near the mouth to steep hills around the head waters. Near the head waters the stream flows through steep valleys and is fed by small streams and gullies from the hillsides. The slope of the stream varies from about 2 feet per mile in the flatlands near its mouth to about 70 feet per mile near the head waters. There is a precipitous drop of about 60 feet over a length of approximately 0.2 miles in the Village of Williamsville, just below a dam constructed in 1929 as a flood control measure.

Ellicott Creek pursues a very meandering course and achieves a total length of approximately 47 miles in a basin roughly 27 miles long.

Pertinent drainage areas of Ellicott Creek and its tributaries are listed in Table 3.

TABLE 3

DRAINAGE AREAS WITHIN THE ELLICOTT CREEK BASIN

| Ellicott Creek | Distance upstream of Tonawanda Creek, miles | Drainage area above locality, square miles |
|---|---|---|
| Source | 47.3 | 0.0 |
| Elevenmile Creek Junction | 40.0 | 10.4 |
| Crooked Creek Junction | 40.0 | 16.5 |
| Spring Creek Junction | 33.9 | 22.6 |
| Sand Ridge | 31.6 | 38.0 |
| Millgrove Gage (discontinued in 1968) | 28.7 | 40.7 |
| Pavement Road | 23.1 | 62.3 |
| Stony Road Bridge | 21.8 | 67.4 |
| Wehrle Drive Gage | 14.1 | 72.4 |
| Niagara Falls Boulevard | 3.4 | 101.7 |
| Tonawanda Creek Junction | 0.0 | 110.0 |

## Description and Development in the Flood Plain

### Town of Lancaster

This reach covers a distance of approximately 5.2 miles and extends from Stony Road upstream to Townline Road. In this reach the major development along both the banks is confined to mainly residential and a few commercial units. The main highways are Walden and Genesee Roads. A flood hazard to those other roads crossing the creek would be severe during major floods.

### Town and Village of Alden

The stream length covered in this reach is about 8.6 miles starting from Townline Road upstream to Crittenden Road in the Village of Alden. The flood damage potential in this reach, is greater than in the Town of Lancaster because there is more development in the flood plain.

The purpose of this report is to identify the flood plain as shown on plates 2 and 3, and the frequency of flood stages so that future development can make the most effective use of the area without suffering an increase in present damages.

## Bridges Across the Stream

At present there are thirteen (13) bridges which cross Ellicott Creek within the study area. Table 4 lists pertinent data for these structures and shows the relationship between the Fifty Year Flood, Intermediate Regional Flood and Standard Project Flood. Figures 2 through 13 are photographs of some of the bridges which cross over Ellicott Creek. Most of the bridges within the study area are not considered to be overly constrictive because of the elevation of the adjacent roads which allow large amounts of overbank flow. However, high road elevations of several bridges cause severe obstructions to flood flows. An estimate of

TABLE 4

BRIDGES ACROSS ELLICOTT CREEK

| Mile Above Mouth | Identification | Stream Bed Elevation | Floor Elevation (2) | Standard Project Flood Crest Elevation (1) | Intermediate Regional Flood Crest Elevation (1) | 50-Year Flood Crest Elevation (1) | Under Clearance Low Steel Elevation |
|---|---|---|---|---|---|---|---|
| 21.75 | Stony Road | 708.80 | 722.00 | 723.34 | 720.98 | 718.56 | 718.57 |
| 23.11 | Pavement Road | 714.70 | 728.90 | 732.74 | 724.46 | 724.17 | 725.03 |
| 25.06 | Foxall Road | 721.80 | 727.00 | 741.86 | 733.38 | 732.72 | 726.52 |
| 25.90 | Ransom Road | 725.50 | 740.00 | 743.42 | 736.47 | 736.12 | 735.91 |
| 26.94 | Townline Road | 739.80 | 760.00 | 756.04 | 748.45 | 748.26 | 757.25 |
| 27.78 | Zoellner Road | 747.20 | 760.70 | 762.97 | 756.45 | 756.15 | 758.18 |
| 28.59 | Home Road | 749.40 | 767.40 | 770.63 | 761.47 | 760.87 | 759.83 |
| 29.24 | Walden Avenue | 757.10 | 771.60 | 775.08 | 767.05 | 766.66 | 766.92 |
| 29.72 | Penn Central | 763.20 | 793.30 | 780.19 | 772.65 | 772.03 | 777.03 * |
| 29.94 | Farm Road | 764.00 | 785.10 | 786.93 | 774.16 | 773.51 | 767.35 * |
| 30.43 | Lehigh Valley | 769.80 | 797.90 | 789.62 | 778.48 | 777.87 | 783.70 |
| 32.26 | Sandridge Road | 791.80 | 810.60 | 815.47 | 804.90 | 804.03 | 806.40 |
| 35.58 | Crittenden Road | 807.00 | 824.90 | 825.43 | 819.46 | 818.98 | 820.91 |

(1) All elevations referred to upstream side of respective bridges.

(2) All floor elevations are taken at the centerline of the street.

* These elevations refer to the springline of arched bridges.

NOTE: All elevations are referred to U.S.Coast and Geodetic Survey Datum the relative effects of the bridge constrictions can be obtained by inspection of the water surface profiles shown on plates 4 and 5. These profiles should be used as a guide for all future construction of new bridges or alterations to existing bridges which cross the creek in the study area. To assure against an increase in water surface elevation or head loss caused by insufficient bridge waterway opening, future construction of bridges should include sufficient clearance for drift and debris which usually accompany a highwater occurrence.

## 1963 Flood Elevation

Figures 14 and 15 show the elevation of a reported flood that occurred in 1963. Though a considerable sized rock lying about 1000 ft. upstream of Farm Road bridge indicates this level, the bridge on Wende Road provides a better picture.

## Other Areas in the Study Reach

Figures 16 and 17 show how Ellicott Creek for the most part flows during normal periods with a majestic, picturesque pattern of flow.

## Obstruction to Flood Flows

The effects of obstructions to flood flows due to bridges which traverse the channel are shown on the profiles on plates 4 and 5 and in figures 2 through 13. Another serious obstruction to flood flows is the condition of the channel itself. It has many bends, irregular sections, and in many locations is lined with heavy brush, weeds, and large trees growing on the channel banks and extending into the stream.

Figure 2 - View looking downstream toward Stony Road Bridge shows typical weed growth which reduces channel capacity.

Figure 3 - View looking upstream toward Stony Road Bridge shows brush grown banks which restrict flows.

Figure 4 - View looking upstream at Pavement Road Bridge.

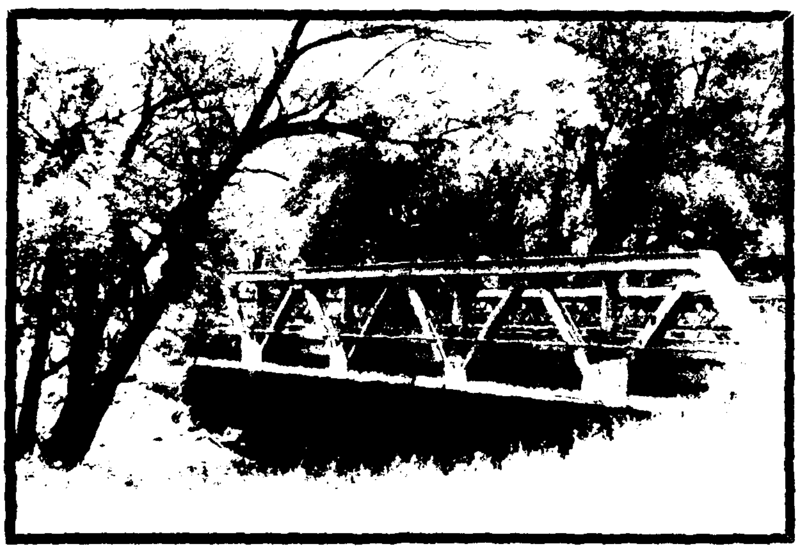


Figure 5 - View looking downstream at Pavement Road Bridge. The bridge deck is very low with respect to the stream bed so that even moderate flooding would overflow the road.

Figure 6 - Upstream view of Bridge at Townline Road. There is considerable clearance from stream bed to bridge. Only a very severe flood would overflow bridge.

Figure 7 - Looking upstream at Zoeller Road bridge, mile 27.78. Note the scenic appearance of the entire portion and the amount of vegetation.

Figure 8 - View looking upstream at Home Road bridge mile 28.59. Note the shrubs and other vegetation on both the banks.

Figure 9 - Closeup of Home Road Bridge. The large clearance from the stream bed eliminates the bridge from being over-topped except under Standard Project Flood conditions.

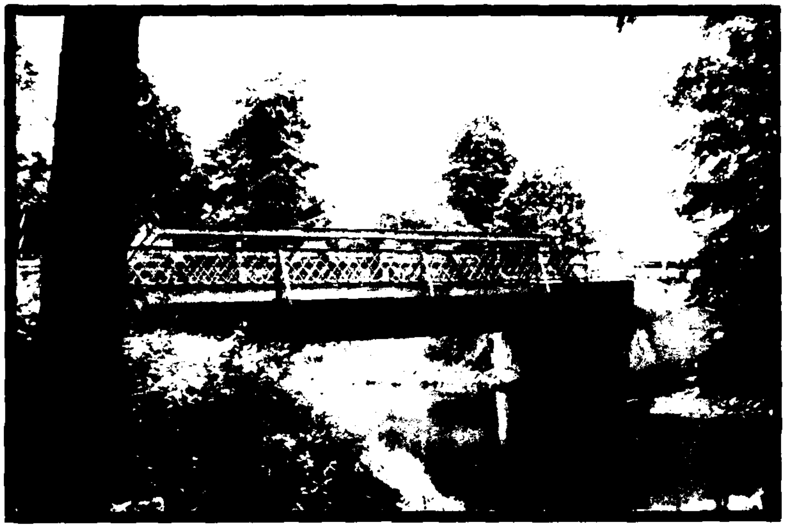


Figure 10 - View looking upstream toward bridge at Walden Avenue just east of County Home, mile 29.24. Normal flow is usually well below the bridge.

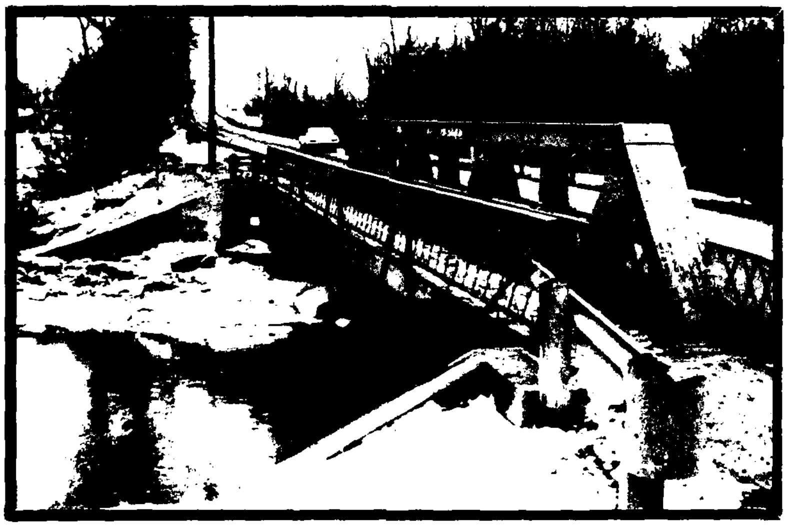


Figure 11 - This bridge on Ellicott Creek at Walden and Wende would be submerged by a flood of Standard Project magnitude.

Figure 12 - Farm Road bridge at mile 29.94. This bridge would be completely submerged by the Standard Project Flood.

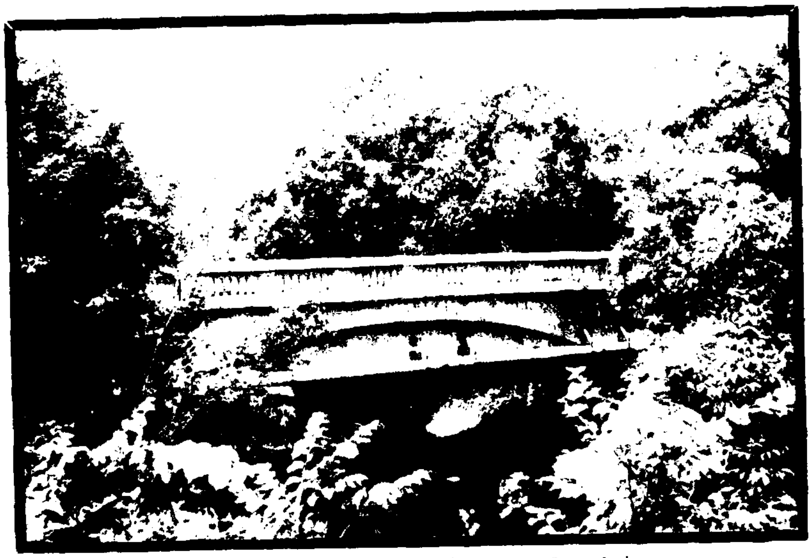


Figure 13 - Farm Road bridge, looking downstream. This reach is obstructed by large trees and other vegetation and therefore offers a high resistance to flood flows.

Figure 14 - Looking upstream at Wende Road Bridge. The sign shows a reported level of high water in 1963.

Figure 15 - This rock, which is approximately 1000 feet upstream from the Farm Road Bridge also shows a reported 1963 flood level.

Figure 16 - This view upstream from near Wende and Wilden Avenue is typical of the scenic beauty of Ellicott Creek in this Area.

Figure 17 - The gently sloping banks shown here is typical of sections of the stream where [illegible] [illegible] during high water periods.

## FLOOD SITUATION

### Flooded Areas, Flood Profiles, and Cross Sections

Plates 2 and 3 show the approximate areas along Ellicott Creek that would be inundated by the Fifty Year, the Intermediate Regional and Standard Project Floods. The actual limits of these overflow areas on the ground may vary some from those shown on the map because the 10-foot contour interval and scale of the map do not permit precise plotting of the flooded area boundaries.

Plates 4 and 5 show the water surface profiles for the Fifty Year, Intermediate Regional and Standard Project Floods.

Plates 6 through 9 show 12 valley sections that are indicative of the flood plain within the study area investigated. The locations of these sections are shown on plates 2 through 5. The approximate elevations of the Fifty Year Flood, Intermediate Regional Flood and Standard Project Flood are indicated on the sections.

By using the flooded area maps, flood profiles, and cross sections contained in this report as a guide, limited urban development, dependent upon the frequency of flooding, can be allowed in the flood plain. Continued recreational use of the flood plain for parks, marinas and golf courses should be encouraged. Similar land use as well as other low damage construction should be stressed during future development in areas which are susceptible to frequent flooding. If future high value development is considered in areas subject to frequent flooding the structures should be constructed on fill or means of flood proofing the structures should be given careful consideration. No structures should be placed within the Floodway of the stream. The Floodway is a strip of land on either side of the stream that is reserved for future flood flows.

## FLOOD DESCRIPTIONS

Descriptions of known large floods that have occurred on Ellicott Creek are based upon field investigations, historical records and newspaper accounts. The greatest flood of historical record along Ellicott Creek was in March 1936. Other damaging floods occurred in March 1916, January 1929 and March 1960. The only reported summer flood was June 1937. All of these floods with the exception of the June 1937 flood were caused by melting snow accompanied with moderate amounts of precipitation. This information is presented as an example of the type and extent of flood problems which have already occurred and as an indication of possible future flood problems.

This concludes the "General Conditions and Past Floods" section of this report. But what can be done to prevent and/or reduce future flood damages? Local governments can develop and enforce as soon as possible flood plain regulations based on the information contained in this report. This information provides them with the necessary legal tools to control the extent and type of development which should be allowed to take place within the flood plain. Regulation of the flood plain can usually be carried out most effectively by a combination of the several regulatory methods ... zoning ordinances, subdivision regulations and building codes. They should also police and maintain the floodway so as to insure against the overgrowth of brush, weeds, debris and large trees from obstructing flood flows since all these factors can result in increased river stages. The U.S.Army Corps of Engineers has prepared and is distributing to state, county and local governments copies of pamphlets entitled "Guidelines for Reducing Flood Damages" and "Introduction to Flood Proofing". The combination of data presented in this report and the pamphlets will provide general guidelines for flood damage reduction to future development within the Ellicott Creek flood plain. Figure 18 on page 33 lists the corrective and preventive measures described in the above-mentioned pamphlets. The U.S. Army Corps of Engineers will distribute to state, county and local governments other helpful pamphlets as well as additions to existing pamphlets as they are developed.

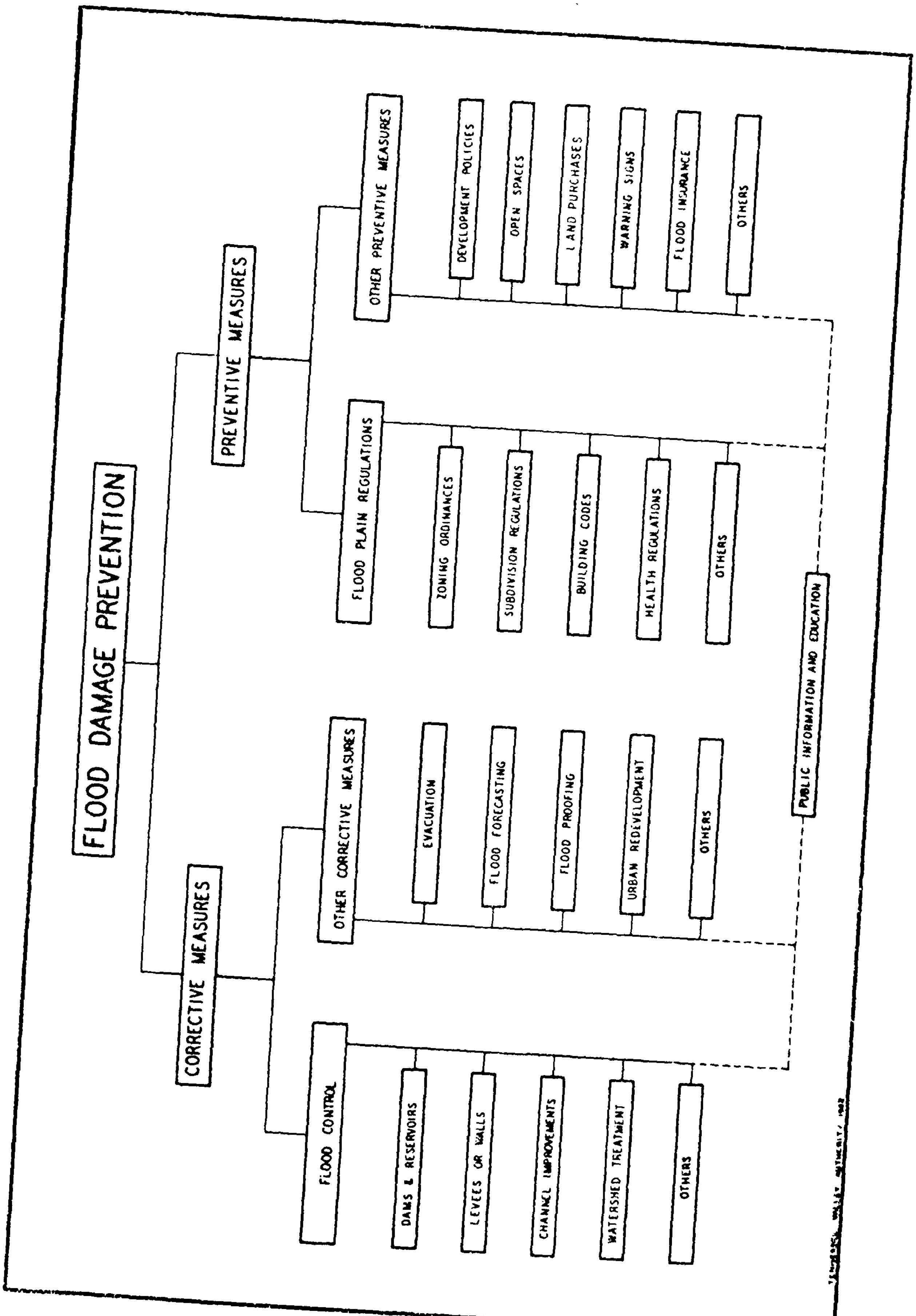

FLOOD DAMAGE PREVENTION
CORRECTIVE MEASURES
PREVENTIVE MEASURES
FLOOD CONTROL
DAMS & RESERVOIRS
LEVEES OR WALLS
CHANNEL IMPROVEMENTS
WATERSHED TREATMENT
OTHERS
OTHER CORRECTIVE MEASURES
EVACUATION
FLOOD FORECASTING
FLOOD PROOFING
URBAN REDEVELOPMENT
OTHERS
FLOOD PLAIN REGULATIONS
ZONING ORDINANCES
SUBDIVISION REGULATIONS
BUILDING CODES
HEALTH REGULATIONS
OTHERS
OTHER PREVENTIVE MEASURES
DEVELOPMENT POLICIES
OPEN SPACES
LAND PURCHASES
WARNING SIGNS
FLOOD INSURANCE
OTHERS
PUBLIC INFORMATION AND EDUCATION



FIGURE 18

## FUTURE FLOODS

Large floods have been experienced in the past on streams in the g neral geographical and physiographical region of this study. Climatological conditions similar to those causing these floods could occur over the Ellicott Creek basin. In this event, floods would result on Ellicott Creek comparable in magnitude with those experienced on neighboring streams. It is therefore desirable, in connection with any determination of future floods which may occur on Ellicott Creek to consider storms and floods that have occurred in the region. Table 5 lists the maximum known floods that have occurred, their date, peak discharge, discharge per square mile, and recurrence interval that have occurred at various U.S.G.S. gaging stations in the region of this study area. Also shown in Table 5 are the estimated peak discharges that have occurred at various stream locations prior to the installation of the U.S.G.S. gaging station. Although in some instances the Ellicott Creek basin differs in area and terrain from other streams, the tabulation indicates that floods of greater magnitude than have occurred in the study area are likely to occur.

The Standard Project Flood concept was developed by the U.S.Army Corps of Engineers and it provides an indication of the upper limit of flooding in any particular area. Although the occurrence of a flood of this magnitude is possible, a flood of greater magnitude would be very rare. Floods of Fifty Year and Intermediate Regional magnitude, although not as high as the Standard Project Flood, may reasonably be expected to occur more frequently than the Standard Project Flood. Any of these floods could occur at any time.

TABLE 5

MAXIMUM KNOWN FLOOD DISCHARGES AT U.S.G.S. GAGING STATIONS IN THE REGION OF ELLICOTT CREEK, NEW YORK

| Stream | Location | Period of Record | Drainage Area | Date | Peak discharge of record | | Estimated recurrence Interval * | Estimated peak discharge (3) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Amount | per sq. mi. | | Date | Discharge | Estimated recurrence Interval |
| | New York | (Years) | (sq.mi.) | | (cfs) | (cfs) | (years) | | (cfs) | (years) |
| Cattaraugus Cr. | Gowanda | 27 | 432 | 17 Mar '42 | 35,900 | 83 | 30 | | | |
| Buffalo Cr. | Gardenville | 28 | 144 | 1 Mar '55 | 13,000 | 90 | 20 | June '37 | 16,000 | 90 |
| Cayuga Cr. | Lancaster | 27 | 94.9 | 22 Jan '59 | 8,750 | 92 | 15 | June '37 | 18,000 | greater than 200 |
| Cazenovia Cr. | Ebenezer | 25 | 134 | 1 Mar '55 | 13,500 | 101 | 25 | | | |
| Scajaquada Cr. | Cheektowaga | 9 | 15.9 | 7 Aug '63 | 2,620 | 165 | 100 | | | |
| Little Tona.Cr. | Linden | 51 | 22.1 | 7 Mar '56 | 2,700 | 122 | 35 | | | |
| Tonawanda Cr. | Batavia | 21 | 171 | 31 Mar '60 | 7,200 | 42 | 15 | | | |
| Tonawanda Cr. | Alabama | 11 | 231 | 1 Apr '40 | 9,000 (1) | 39 | 20 | | | |
| Tonawanda Cr. | Rapids | 11 | 351 | 1 Apr '60 | 10,600 (1)(2) | 30 | 25 | | | |
| Ellicott Cr. | Williamsville | 12 | 72.4 | 31 Mar '60 | 4,860 | 67 | 15 | Mar '36 | 6,500 | 50 |

* Based on conditions of development at time of flood.

(1) Estimated by Corps of Engineers.

(2) Includes overflow down Black Creek.

(3) Estimated by Corps of Engineers from known high water marks and hydraulic computations.

Unfortunately, when data are given pertaining to future floods such as the Intermediate Regional and Standard Project, people have the opinion that this will probably not happen during their lifetime and have a tendency to ignore the potential problems. Although it is true that the Fifty Year and Intermediate Regional Floods have recurrence intervals of once in 50 years and once in 100 years respectively, and the Standard Project Flood is even less frequent, it must be kept in mind, that any of these floods can happen in any given year.

## DETERMINATION OF INTERMEDIATE REGIONAL FLOODS

The Intermediate Regional Flood is defined as a flood having a recurrence interval of once in 100 years, at a designated location, although the flood may occur in any year or in consecutive years. Some probability estimates are based on statistical analyses of stream flow records available for the basin under study, but limitations in such records usually require analyses of rainfall and run-off characteristics in the "general region" of the area under study. The Intermediate Regional Flood represents a major flood, although it is much less severe than the Standard Flood.

Results of the studies indicate that the Intermediate Regional Flood on Ellicott Creek at the Stony Road Bridge would have a peak discharge of 6,350 cubic feet per second, and a peak discharge of 3,600 cubic feet per second at Crittenden Road Bridge. This difference in discharge is due to the increase in tributary area in the direction of stream flow.

TABLE 6

INTERMEDIATE REGIONAL FLOOD PEAK DISCHARGES

| Location | Creek Mile | Discharge (cfs) |
|---|---|---|
| Stony Road Bridge | 21.75 | 6,350 |
| Town Line Road Bridge | 26.94 | 5,318 |
| Lehigh Valley Bridge | 30.43 | 4,624 |
| Crittenden Road Bridge | 35.58 | 3,600 |

An Intermediate Regional Flood on Ellicott Creek in the reach investigated, would be from 0.19 foot to 2.42 feet higher than the Fifty Year Flood.

## DETERMINATION OF STANDARD PROJECT FLOODS

Only in rare instances has a specific stream experienced the largest flood that can be expected to occur. Severe as the maximum known flood may have been on any given stream, it is a commonly accepted fact that in practically all cases, sooner or later a larger flood can and probably will occur. The Corps of Engineers, in cooperation with the Weather Service, has made broad and comprehensive studies and investigations based on the vast records of experienced storms and floods and has evolved generalized procedures for estimating the flood potential of streams. These procedures have been used in determining the Standard Project Flood. It is defined as the largest flood that can be experienced from the most severe combination of meteorological and hydrological conditions that is considered reasonably characteristic of the geographical region involved. Although the Standard Project Flood has only a rare chance of occurrence, it is not the most severe flood that could occur. The Standard Project Storm rainfall used for Ellicott Creek at the U.S.G.S. gaging station in Williamsville, amounts to 4.52 inches in three hours, 9.03 inches in six hours, 11.89 inches in 24 hours, and a total of 14.49 inches in 96 hours. Peak discharges of the Standard Project Flood on Ellicott Creek at various locations within the study area are shown in Table 7. In July 1942, rainfall in excess of 20 inches was observed in northern Pennsylvania and southern New York over a 2000 square mile area. In July 1935, 10.5 inches of precipitation was recorded at Burdett, New York in a 48-hour period. Hurricane Agnes produced the most disastrous flooding in the Nations history. Total storm rainfall averaged 8 to 12 inches with as much as 18.8 inches reported in Schuyklill County Pennsylvania.

TABLE 7

STANDARD PROJECT FLOOD PEAK DISCHARGE

| Location | Creek Mile | Discharge (cfs) |
|---|---|---|
| Stony Road Bridge | 21.75 | 23,800 |
| Townline Road Bridge | 26.94 | 18,771 |
| Lehigh Valley Bridge | 30.43 | 15,390 |
| Crittenden Road Bridge | 35.58 | 10,400 |

Frequency

It is not practical to assign a frequency to a Standard Project Flood. The occurrence of such a flood would be a very rare event.

Possible Larger Floods

Floods larger than the Standard Project Flood are possible; however, the combination of factors that would be necessary to produce such floods would seldom occur. The consideration of floods of this magnitude is of greater importance in some problems than in others but should not be overlooked in the study of any problems.

## HAZARDS OF GREAT FLOODS

The amount and extent of damages caused by any flood depends in general on how much area is flooded, the height of flooding, the velocity of flow, the rate of rise and the duration of flooding.

### Areas Flooded and Heights of Flooding

The areas along Ellicott Creek flooded by the Fifty Year, Intermediate Regional and Standard Project Floods are shown on plates 2 and 3. Depths of flow for these events can be estimated from the crest profiles which are shown on plates 4 and 5.

The Fifty Year, the Intermediate Regional and Standard Project Flood elevations were computed by using stream characteristics for selected reaches as determined from observed flood profiles, topographic maps and valley cross sections. The overflow areas shown on plates 2 and 3 and the water surface profiles shown on plates 4 and 5 have been determined with an accuracy consistent with the purpose of this study and the accuracy of the available basic data. The Standard Project Flood overflow in urban areas should be considered to be indicative only, because of the effects of buildings, railroad fills, etc. The water surface profiles of the Standard Project and Intermediate Regional Floods depend to a great extent upon the degree of destruction or clogging of various bridges during the flood occurrence. Because it is impossible to forecast these events; it was assumed that all bridge structures would stand, and that no clogging would occur.

The Standard Project Flood profile for Ellicott Creek is approximately 4.80 feet higher at Stony Road to about 6.45 feet higher at Crittenden bridge than the Fifty Year Flood.

The maximum difference occurs at the upstream side of Farm Road bridge where the Standard Project Flood elevation is about 13.42 feet above the Fifty Year Flood. This is caused principally, by the high roadway elevation and small bridge opening.

The Intermediate Regional Flood profile is approximately 2.42 higher at Stony Road to about 0.48 feet higher at Crittenden,than the Fifty Year Flood. The maximum difference occurs at the upstream side of Stony Road bridge where it is about 2.42 feet higher than the Fifty Year Flood.

The approximate heights that would be reached at structures presently existing within the flood plain covered by this report by the Standard Project Flood, the Intermediate Regional Flood are shown in figures 19 through 24.

Elevations of the Intermediate Regional and Standard Project Floods should be given careful consideration in all future planning especially where there is a large difference between past and possible future flood heights.

Velocities of Flooding

Average channel velocities during floods depend largely upon the size and shape of the channel section, the composition of the surface with which the water is in contact, the condition of the stream, and the slope of the channel bottom all of which vary on different streams and at different locations on the same stream.

Tables 8, 9 and 10 list the average velocities that would occur in the channel and overbank areas for a discharge of the Fifty Year, Intermediate Regional and the Standard Project Flow magnitudes respectively.

NOTE: Since Tables 8,9 and 10 indicate only average velocities, maximum velocities would be somewhat greater in both the channel and overbank areas.

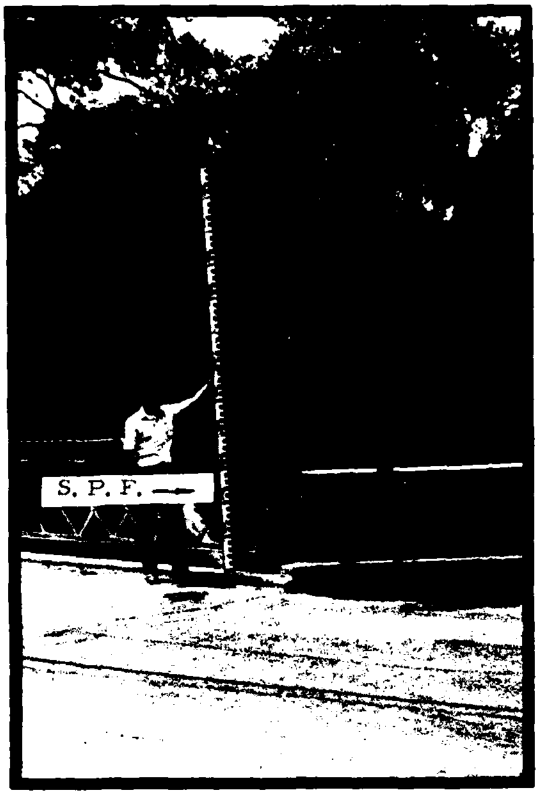



Figure 19 - This bridge at Millgrove Road on Ellicott Creek would be well under water due to a flood such as Standard Project Flood.


Figure 20 - This picture shows that the roadway of the Crittenden Road bridge in the Village of Alden would be almost submerged from the Standard Project Flood.


Figure 21 - Shows Standard Project Flood and Intermediate Regional Flood heights at Pavement Road bridge, mile 23.11, in the Town of Lancaster.

Figure 22 - Photo showing Standard Project Flood height at an existing building on Townline Road, Lancaster, New York. The building would be half submerged under such a flood. Intermediate Regional Flood elevation also is shown.


Figure 23 - Standard Project Flood and Intermediate Regional Flood heights are shown at a building under construction on Stony Road in the Town of Lancaster.


Figure 24 - Height of the Standard Project Flood is shown at the sewage treatment plant, Village of Alden, New York.

TABLE NO. 8

FIFTY YEAR FLOOD VELOCITIES

| Location | Creek Mile | Average Velocities * (feet per second) Channel | Over Bank |
|---|---|---|---|
| Stony Road | 21.75 | 5.66 | 2.56 |
| Pavement Road | 23.11 | 8.70 | 0.00 |
| Foxall Bridge | 25.06 | 3.96 | 1.20 |
| Ransom Road | 25.90 | 13.36 | 0.00 |
| Townline Road | 26.94 | 8.16 | 0.00 |
| Zoeller Road | 27.78 | 5.74 | 0.00 |
| Home Road | 28.59 | 9.01 | 0.00 |
| Walden Avenue | 29.24 | 4.91 | 0.00 |
| Penn Central Railroad | 29.72 | 5.85 | 0.00 |
| Farm Road | 29.94 | 6.79 | 0.00 |
| Lehigh Valley | 30.43 | 7.33 | 0.00 |
| Sandridge Road | 32.26 | 7.85 | 0.00 |
| Crittenden Road | 35.58 | 2.80 | 0.77 |

* Refers to velocities through the bridge section

TABLE NO. 9

INTERMEDIATE REGIONAL FLOOD VELOCITIES

| Location | Creek Mile | Average Velocities * (feet per second) Channel | Over Bank |
|---|---|---|---|
| Stony Road | 21.75 | 4.51 | 1.78 |
| Pavement Road | 23.11 | 9.72 | 0.00 |
| Foxall Bridge | 25.06 | 3.91 | 1.24 |
| Ransom Road | 25.90 | 14.44 | 0.00 |
| Townline Road | 26.94 | 9.30 | 0.00 |
| Zoeller Road | 27.78 | 6.43 | 0.00 |
| Home Road | 28.59 | 9.54 | 0.00 |
| Walden Avenue | 29.24 | 5.43 | 0.00 |
| Penn Central Railroad | 29.72 | 6.16 | 0.00 |
| Farm Road | 29.94 | 7.33 | 0.00 |
| Lehigh Valley | 30.43 | 7.77 | 0.00 |
| Sandridge Road | 32.26 | 8.39 | 0.00 |
| Crittenden Road | 35.58 | 2.98 | 0.86 |

* Refers to velocities through the bridge

TABLE NO. 10

STANDARD PROJECT FLOOD VELOCITIES

| Location | Creek Mile | Average Velocities* (feet per second) Channel | Over Bank |
|---|---|---|---|
| Stony Road | 21.75 | 11.10 | 4.22 |
| Pavement Road | 23.11 | 14.84 | 2.39 |
| Foxall Bridge | 25.06 | 3.97 | 1.68 |
| Ransom Road | 25.90 | 4.36 | 1.94 |
| Townline Road | 26.94 | 11.46 | 2.19 |
| Zoeller Road | 27.78 | 6.54 | 2.77 |
| Home Road | 28.59 | 8.35 | 3.43 |
| Walden Avenue | 29.24 | 5.00 | 2.03 |
| Penn Central Railroad | 29.72 | 10.01 | 0.00 |
| Farm Road | 29.94 | 13.24 | 0.00 |
| Lehigh Valley | 30.43 | 11.97 | 0.00 |
| Sandridge Road | 32.26 | 6.54 | 2.64 |
| Crittenden Road | 35.58 | 4.86 | 1.72 |

* refers to velocities through the bridge

## FLOOD PLAIN MANAGEMENT

Management of the flood plain can be carried out by a variety of means: encroachment lines, zoning ordinances, subdivision regulations, and modifications or additions to building codes. These methods will be described subsequently in some detail. However, it is not the purpose or intent of this report to recommend the specific technique to be used.

Implementation of flood plain management techniques is the responsibility of State and local governments. This report is provided to furnish the State and local governments with an engineering basis for their appropriate action. The data in this report can be used in conjunction with a comprehensive land use plan to develop a reasonable and desirable plan for managing the Ellicott Creek flood plain in the study area.

Fortunately, the need for flood plain planning in Ellicott Creek has been recongized by local interests. This means that future damages in the study area can be reduced, at little or no cost to the taxpayer, by developing and enacting flood plain regulations. The flood data in this report, together with a planning program for future land use, will enable State and local interests to minimize flood damage risks.

Flood plain management may also include other methods which are helpful, particularly in special localized areas. These include park and open space developments, evacuation, urban redevelopment, flood proofing, tax reductions, and warning signs.

Encroachment Lines - A designated floodway is the area of channels and those portions of the flood plains adjoining the channel which are reasonably required to carry and discharge the floodwater or flow of a flood of a specific size without unduly raising upstream water surface elevations. Encroachment lines or limits are the lateral boundaries of this floodway. They are two definitely established lines, one on each side of the river. Between these lines no construction or filling should be permitted which could cause an impedance to flow. If possible, encroachment limits should be established before extensive development has taken place to avoid costly clearance of existing structures. The final choice is a State and/or local decision. In the final analysis, the flood magnitude is determined by consideration of local land use plans and comprehensive statewide flood control plans.

The data contained in this report can be used by State and local interests to determine the size of the regulatory flood, and to establish floodway encroachment lines or limits and land use districts. Problems or situations regarding encroachment at specific points in the study ares should be referred to the appropriate State agency. In New York, the responsible agency is The New York State Department of Environmental Conservation.

Zoning - Zoning is a legal tool used by cities, towns, and counties to control and direct the use and development of land and property within their jurisdiction. Division of a municipality or county into various zones should be the result of a comprehensive planning program for the entire area, with the purpose of guiding its growth. The planning program as such has no legal status. Zoning, as described above, is a legal tool that is used to implement and enforce the details of the planning program. Its objectives are the conservation of property value and the achievement of the most appropriate and beneficial use of available land. Flood plain zoning is not a special type of ordinance, but merely another set of provisions which can be incorporated into a comprehensive zoning ordinance so that flood damage can be minimized. Zoning regulations may be used in lieu of encroachment laws or as a supplement to them. Thus, designated floodways may be zoned for the purpose of passing floodwaters and for other limited uses that do not conflict with that primary purpose. The ordinance may also establish regulations for the flood plain areas outside the floodway. These include designating elevations above which certain types of development must be constructed.

Subdivision Regulations - A subdivision can be defined in a broad sense as a tract or parcel of land divided into two or more lots or other units for the purpose of sale or building development. Subdivision regulations are used by local governments to specify the manner in which land may be subdivided within the entire area under their jurisdiction. Regulations may state the required width of streets, requirements for curbs and gutters, size of lots, elevation of land, freedom from flooding, size of floodways, and other points pertinent to the welfare of the community. It has been found that responsible subdividers favor such regulations because they discourage land speculation and prevent unscrupulous competition from other subdividers who might develop flood hazard land with less than minimum desirable standards. Experience has also shown that various municipal costs are reduced during flood periods and that the annual maintenance required for streets and utilities is minimized. Subdivision regulations provide an efficient means of controlling development in areas which are presently undeveloped. By introducing such regulations early in these areas, planned flood plain development can take place without being hampered by nonconforming uses.

Building Codes - The primary purpose of building codes is to set up minimum standards for controlling the design, construction, and quality of materials used in buildings and structures within a given area, so that life, health, property, and public welfare are safeguarded. Since it may not be practical to prevent the location of any building in all areas subject to flooding, building codes can be used to minimize structural and consequential damages resulting from flood velocities and inundation. Some of the methods adaptable to building codes are:

1. Prevent flotation of buildings from their foundations by specifying anchorage.
2. Establish basement elevations and minimum first floor elevations consistent with potential flood occurences.
3. Prohibit basements in those areas subject to very shallow, infrequent flooding where filling and slab construction would prevent virtually all damage.
4. Require reinforcement to withstand water pressure or high velocity flow and restrict the use of materials which deteriorate rapidly in the presence of water.
5. Prohibit equipment that might be hazardous to life when submerged. This includes chemical storage, boilers, or electrical equipment.

Flood Plain Regulations - Flood plain regulation involves the establishment of legal tools with which to control the extent and type of future development which will be allowed to take place within the flood plain. The regulations must be definitive enough so that there is general public understanding of the problem and the choices of action which the regulations provide. Regulations must be specific enough so that criteria, such as minimum first floor elevations, type of construction, or encroachment limits, are known for the area in question. There are basically two main objectives of regulation. The first is to assure and guarantee the retention of an adequate floodway for the river - floodway being defined as the channel and those portions of the flood plains adjoining the channel, which are reasonably required to carry and discharge the floodwater or flood flow of a flood of a specific size without unduly raising upstream water surface elevations. Its size is based on sound economic and hydraulic criteria. Development and use of the areas lying on either side of the floodway, and which may become inundated by the regulatory flood, should be planned and controlled. The second objective of regulation is to encourage sound land use consistent with the flood hazard and the community land use needs. The water surface profiles combined with the detailed information contained in this report, provide a basis for formulation of flood plain regulations.

## GLOSSARY OF TERMS

Flood

An overflow of lands not normally covered by water and that are used or usable by man. Floods have two essential characteristics. The inundation of land is temporary; and the land is adjacent to and inundated by overflow from a river or stream or an ocean, lake, or other body of standing water.

Normally a "flood" is considered as any temporary rise in stream flow or stage, but not the ponding of surface water, that results in significant adverse effects in the vicinity. Adverse effects may include damages from overflow of land areas, temporary backwater effects in sewers and local drainage channels, creation of unsanitary conditions or other unfavorable situations by deposition of materials in stream channels during flood recessions, rise of ground water coincident with increased stream flow, and other problems.

Flood Crest

The maximum stage or elevation reached by the waters of a flood at a given location.

Flood Peak

The maximum instananeous discharge of a flood at a given location. It usually occurs at or near the time of the flood crest.

Flood Plain

The relatively flat area or low lands adjoining the channel of a river, stream or watercourse or ocean, lake, or other body of standing water, which has been or may be covered by flood water.

Flood Profile

A graph showing the relationship of water surface elevation to location, the latter generally expressed as distance above mouth for a stream of water flowing in an open channel. It is generally drawn to show surface elevation for the crest of a specific flood, but may be prepared for conditions at a given time or stage.

Flood Stage

The stage or elevation at which overflow of the natural banks of a stream or body of water begins in the reach or area in which the elevation is measured.

Head Loss

The effect of obstructions, such as narrow bridge openings or buildings that limit the area through which water must flow, raising the surface of the water upstream from the obstruction.

Intermediate Regional Flood

A flood having an average frequency of occurrence in the order of once in 100 years although the flood may occur in any year. It is based on statistical analyses of streamflow records available for the watershed and analyses of rainfall and runoff characteristics in the "general region of the watershed".

Left Bank

The bank on the left side of a river, stream, or watercourse, looking downstream.

Low Steel (or Underclearance)

See "underclearance".

Right Bank

The bank on the right side of a river, stream, or watercourse, looking downstream.

Standard Project Flood

The flood that may be expected from the most severe combination of meteorological and hydrological conditions that is considered reasonable characteristic of the geographical area in which the drainage basin is located, excluding extremely rare combinations. Peak discharges for these floods are generally about 40% to 60% of the Probable Maximum Floods for the same basins. Such floods, as used by the Corps of Engineers, are intended as practicable expressions of the degree of protection that should be sought in the design of flood control works, the failure of which might be disastrous.

Underclearance

The lowest point of a bridge or other structure over or across a river, stream, or watercourse that limits the opening through which water flows. This is referred to as "low steel" in some regions.

## AUTHORITY, ACKNOWLEDGMENTS AND INTERPRETATION OF DATA

This report has been prepared in accordance with the authority granted by Section 206 of the Flood Control Act of 1960 (PL 86-465), as amended.

*****

Considerable information was obtained from the Review of Reports for Flood Control and Allied Purposes on Tonawanda Creek and Tributaries now being prepared by the Buffalo District.

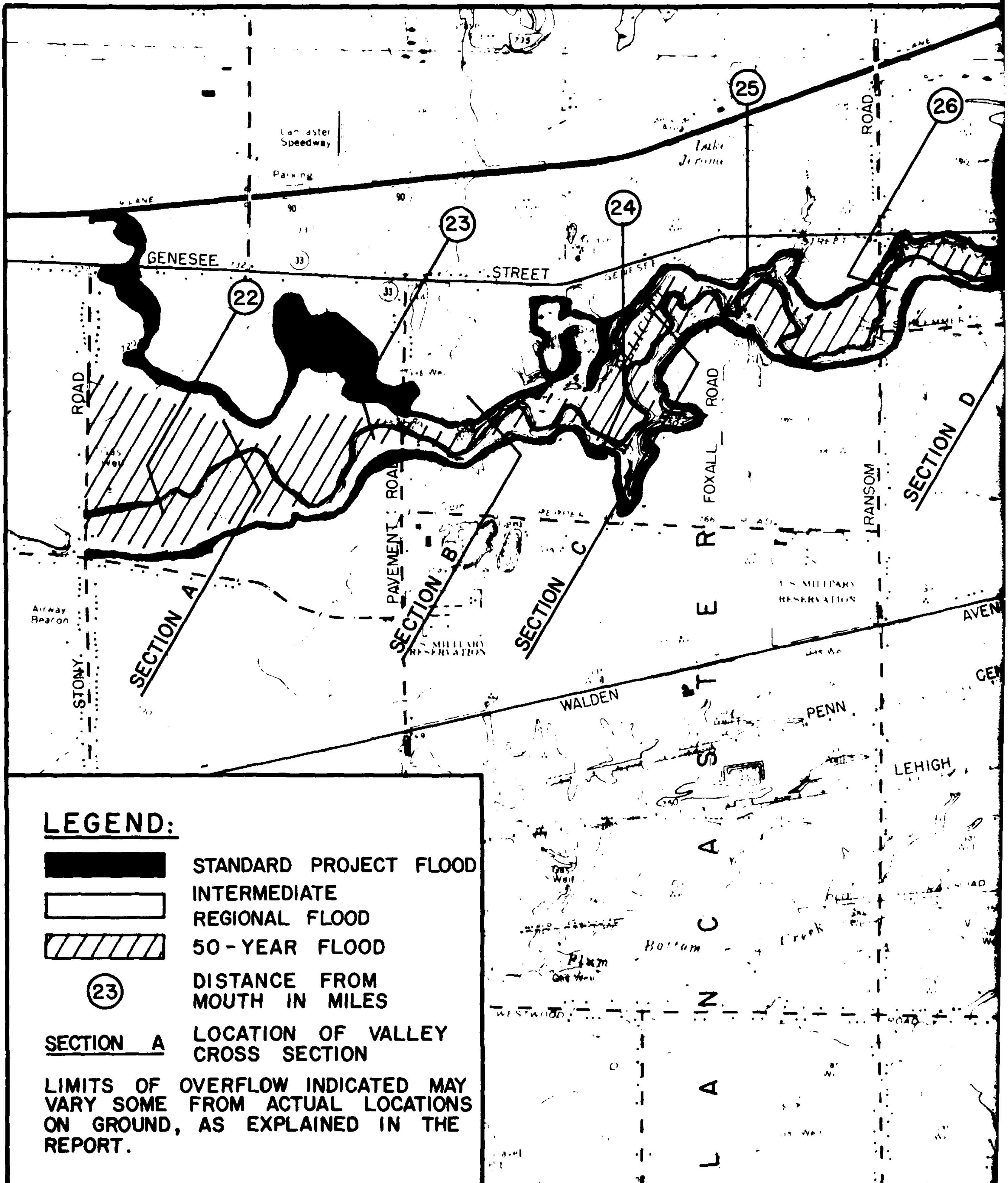
Assistance and cooperation of Federal, State and Local Agencies in supplying useful information is appreciated.

*****

This report presents the local flood situation caused by Ellicott Creek in the Village of Alden and the Towns of Alden and Lancaster, all within Erie County, New York. The U.S.Army Engineer District, Buffalo, will provide, upon request, interpretation and limited technical assistance in the application of the data contained in this report, particularly as to its use in developing effective flood plain regulations. After local authorities have selected the flood magnitude or frequency to be used as the basis for regulation, the Corps of Engineers can assist in the selection of floodway limits by providing information on the effects of various widths of floodway on the profile of the selected flood.

*****

This report has been prepared by Krehbiel-Guay-Rugg-Hall, Consulting Engineers, Tonawanda, New York, for the Corps of Engineers, U.S. Army, Buffalo District,under Contract No. DACW49-72-0024.


LEGEND:
STANDARD PROJECT FLOOD
INTERMEDIATE REGIONAL FLOOD
50-YEAR FLOOD
23
DISTANCE FROM MOUTH IN MILES
SECTION A
LOCATION OF VALLEY CROSS SECTION
LIMITS OF OVERFLOW INDICATED MAY VARY SOME FROM ACTUAL LOCATIONS ON GROUND, AS EXPLAINED IN THE REPORT.
GENESEE
STREET
22
23
24
25
26
SECTION A
SECTION B
SECTION C
SECTION D
STONY ROAD
PAVEMENT ROAD
FOXALL ROAD
RANSOM ROAD
WALDEN
PENN
LEHIGH
LANCASTER
Lancaster Speedway
Parking
Airway Beacon
Bottom
Creek

SCALE — 1" = 2000'

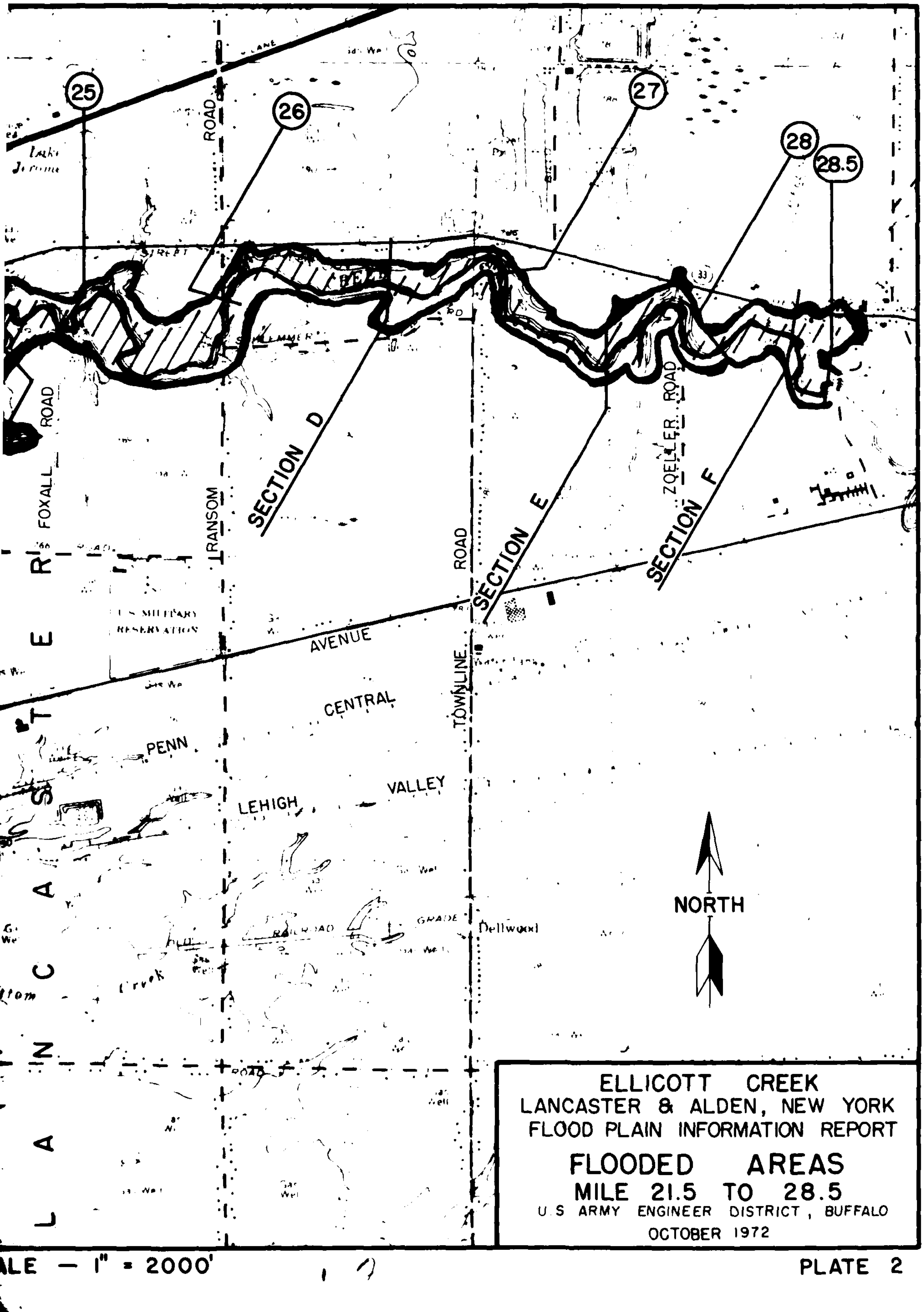



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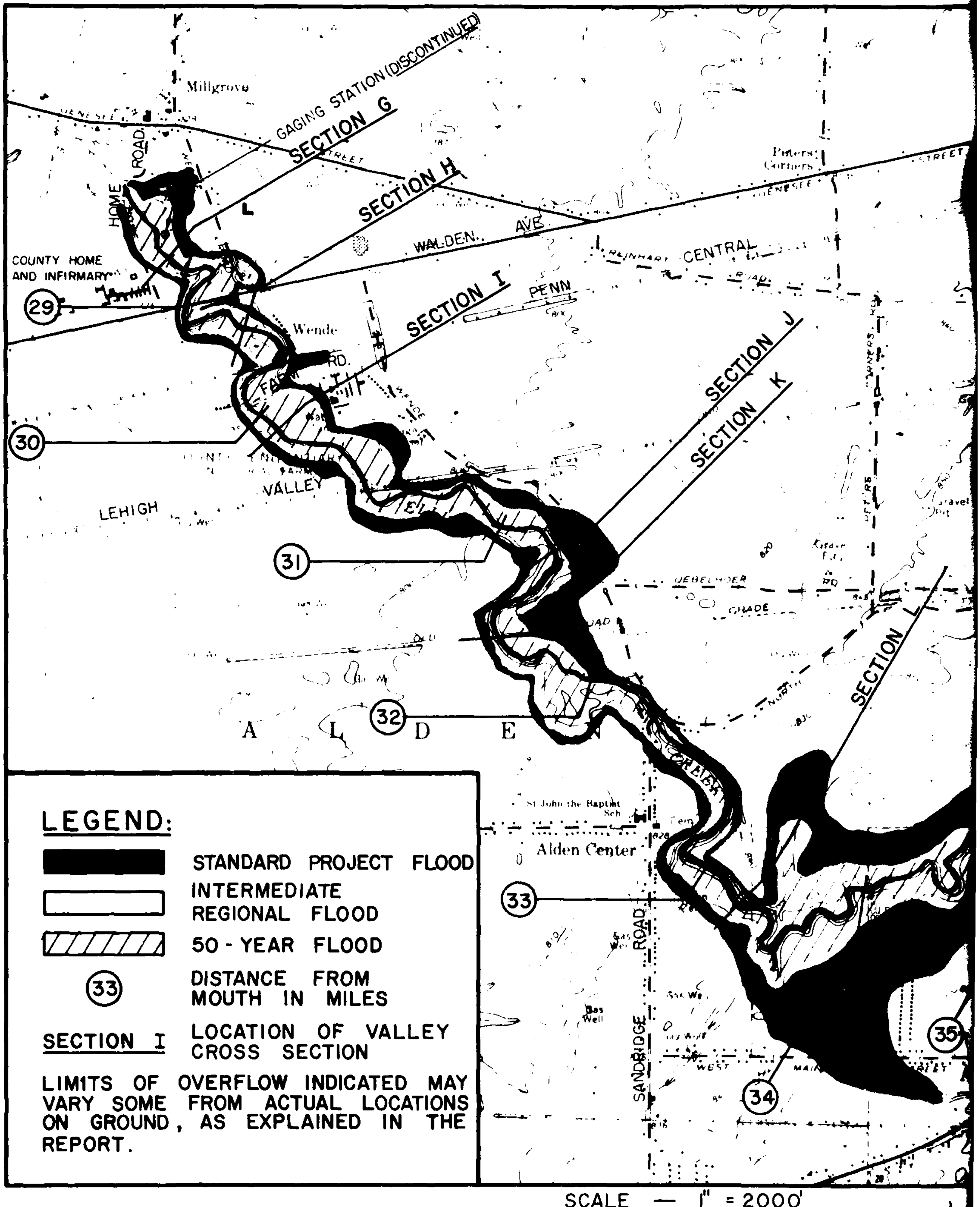
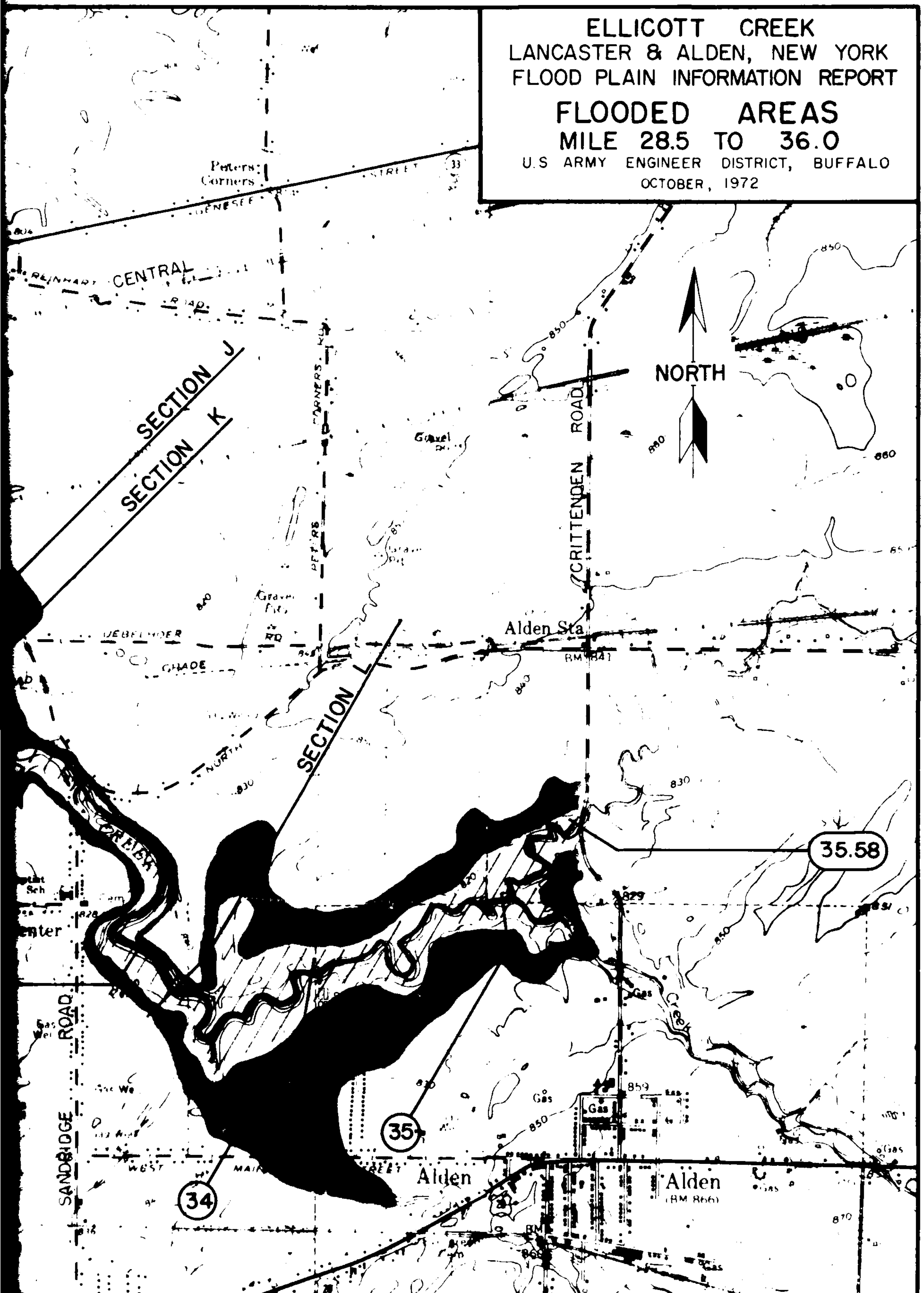
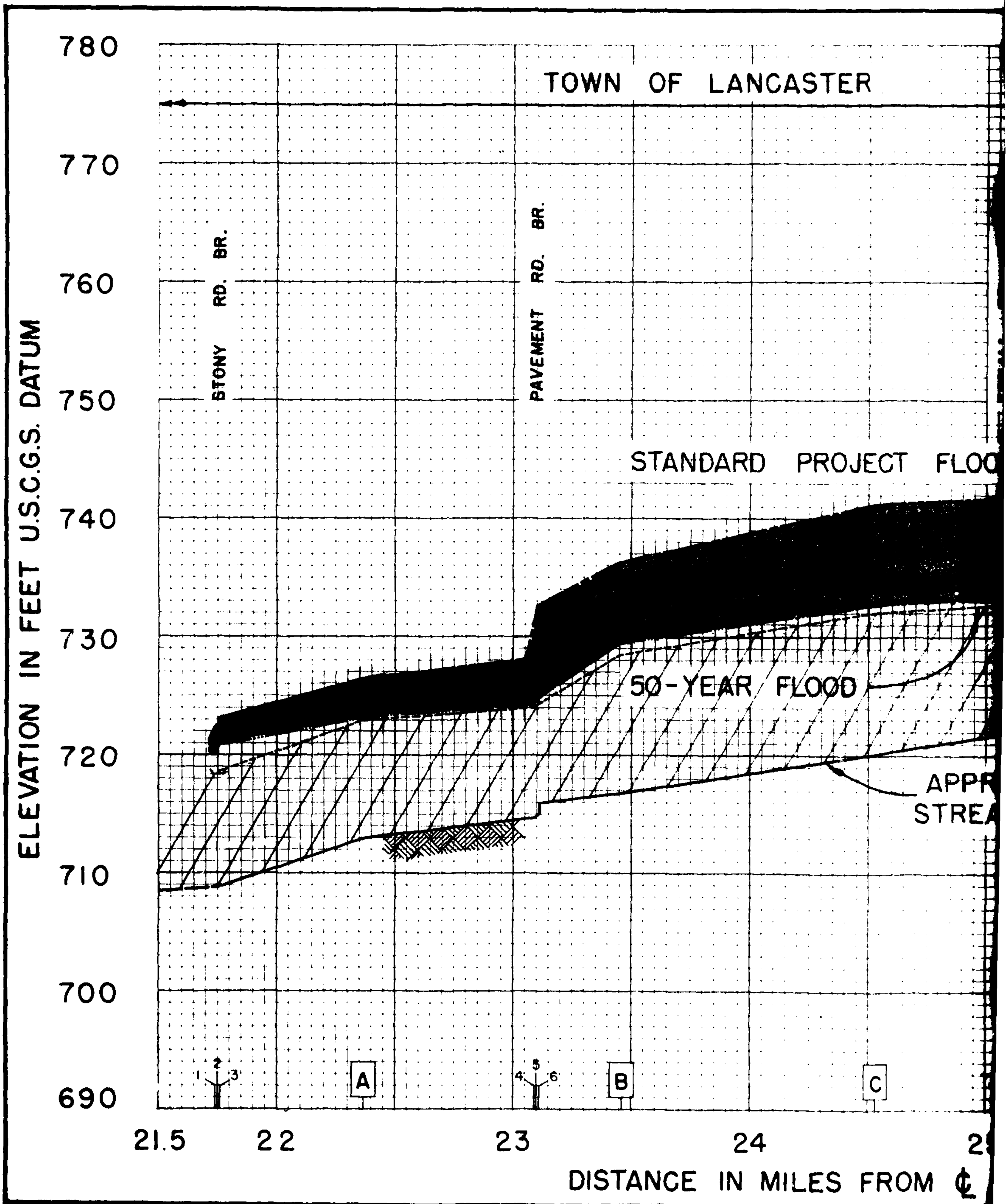
PLATE 2


Millgrove
GAGING STATION (DISCONTINUED)
SECTION G
SECTION H
SECTION I
SECTION J
SECTION K
SECTION L
HOME ROAD
COUNTY HOME AND INFIRMARY
Peters Corners
WALDEN AVE
CENTRAL
PENN
Wende
LEHIGH
VALLEY
UEBELHOER
RD
GRADE
A L D E N
St John the Baptist Sch
Alden Center
SANDRIDGE ROAD
29
30
31
32
33
34
35
LEGEND:
STANDARD PROJECT FLOOD
INTERMEDIATE REGIONAL FLOOD
50 - YEAR FLOOD
33 DISTANCE FROM MOUTH IN MILES
SECTION I LOCATION OF VALLEY CROSS SECTION
LIMITS OF OVERFLOW INDICATED MAY VARY SOME FROM ACTUAL LOCATIONS ON GROUND, AS EXPLAINED IN THE REPORT.
SCALE — 1" = 2000'

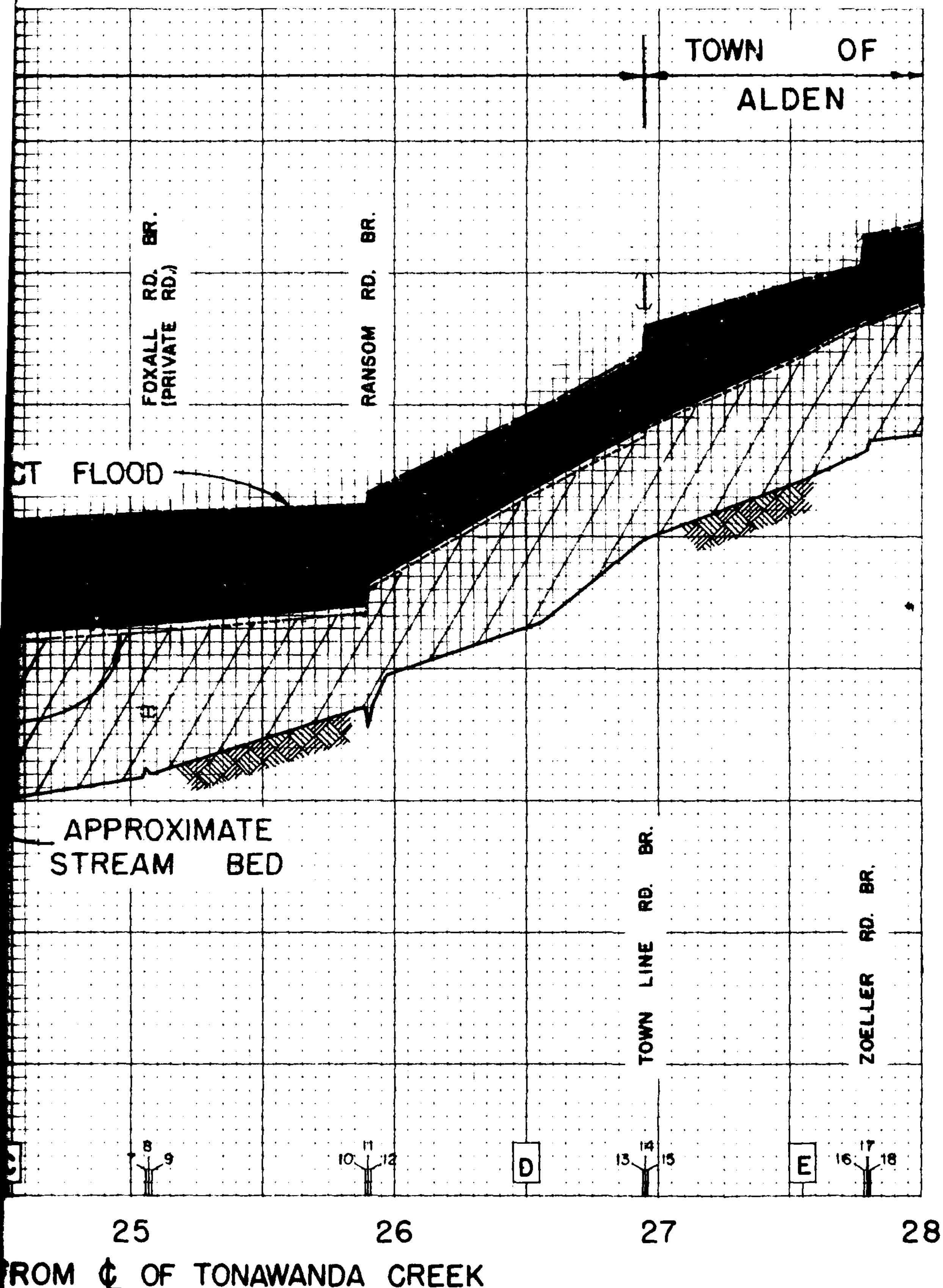



LE — 1" = 2000'

PLATE 3



TOWN OF LANCASTER
STONY RD. BR.
PAVEMENT RD. BR.
STANDARD PROJECT FLOO
50-YEAR FLOOD
APPR
STREA
780
770
760
750
740
730
720
710
700
690
ELEVATION IN FEET U.S.C.G.S. DATUM
A
B
C
21.5
22
23
24
DISTANCE IN MILES FROM ℄




LEGEND

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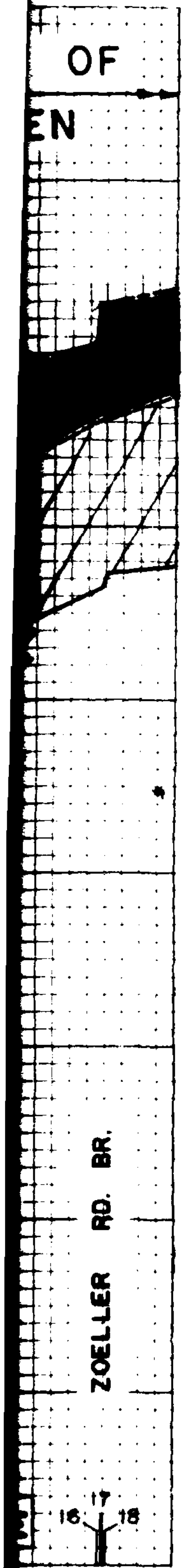



## LEGEND

STANDARD PROJECT FLOOD
INTERMEDIATE REGIONAL FLOOD
50-YEAR FLOOD
APPROX. STREAM BED

APPROX. FLOOR ELEV.

APPROX. LOW STEEL ELEV.

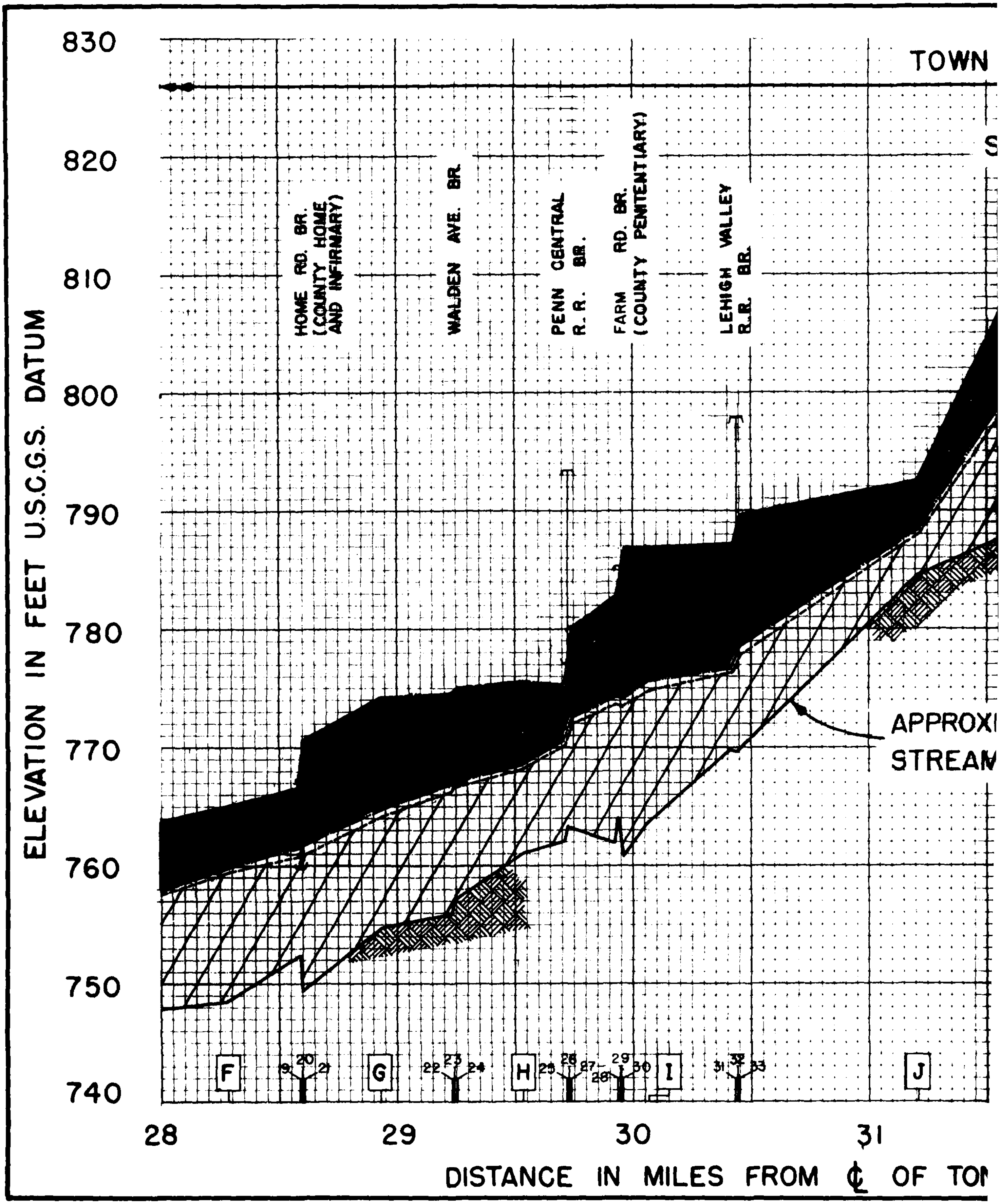
LOCATION OF CROSS-SECTIONS

△ THE LONGITUDINAL SECTION ELEVATIONS ARE BASED ON ACTUAL FIELD SURVEYS AND U.S. GEOLOGICAL QUADRANGLE MAPS.

□ ELEVATIONS OF BRIDGE SECTIONS ALSO ARE BASED ON FIELD SURVEYS AND U.S. GEOLOGICAL QUADRANGLE MAPS.

**ELLICOTT CREEK**
LANCASTER & ALDEN, NEW YORK
FLOOD PLAIN INFORMATION REPORT

**PROFILES**
**MILE 21.5 TO 28.0**
U.S. ARMY ENGINEER DISTRICT, BUFFALO
OCTOBER, 1972



ELEVATION IN FEET U.S.C.G.S. DATUM
830
820
810
800
790
780
770
760
750
740
TOWN
S
HOME RD. BR. (COUNTY HOME AND INFIRMARY)
WALDEN AVE. BR.
PENN CENTRAL R.R. BR.
FARM RD. BR. (COUNTY PENITENTIARY)
LEHIGH VALLEY R.R. BR.
APPROXI
STREAM
F
G
H
I
J
19
20
21
22
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31
32
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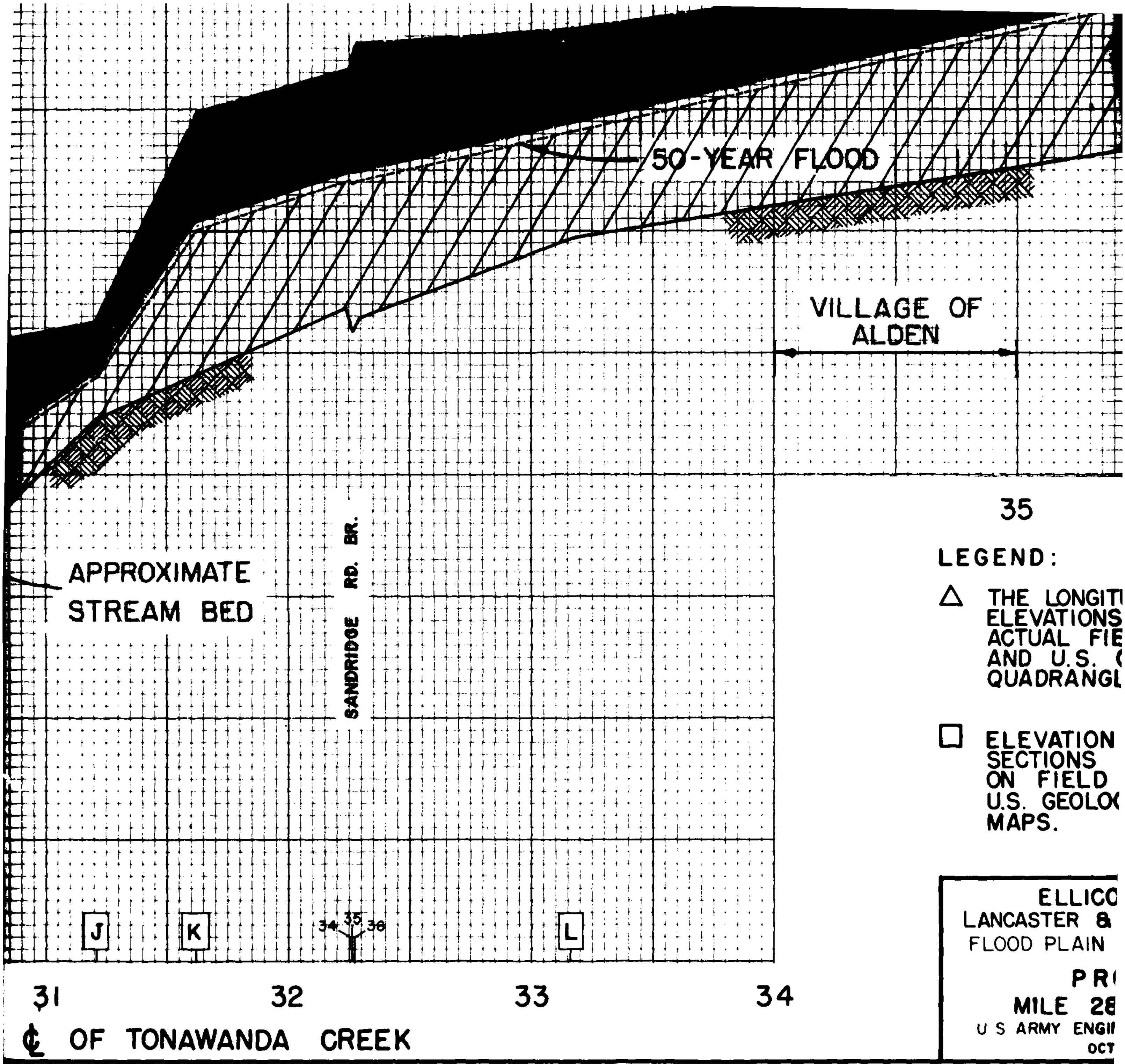
29
30
31
DISTANCE IN MILES FROM ℄ OF TOW



50-YEAR FLOOD
VILLAGE OF ALDEN
APPROXIMATE STREAM BED
SANDRIDGE RD. BR.
J
K
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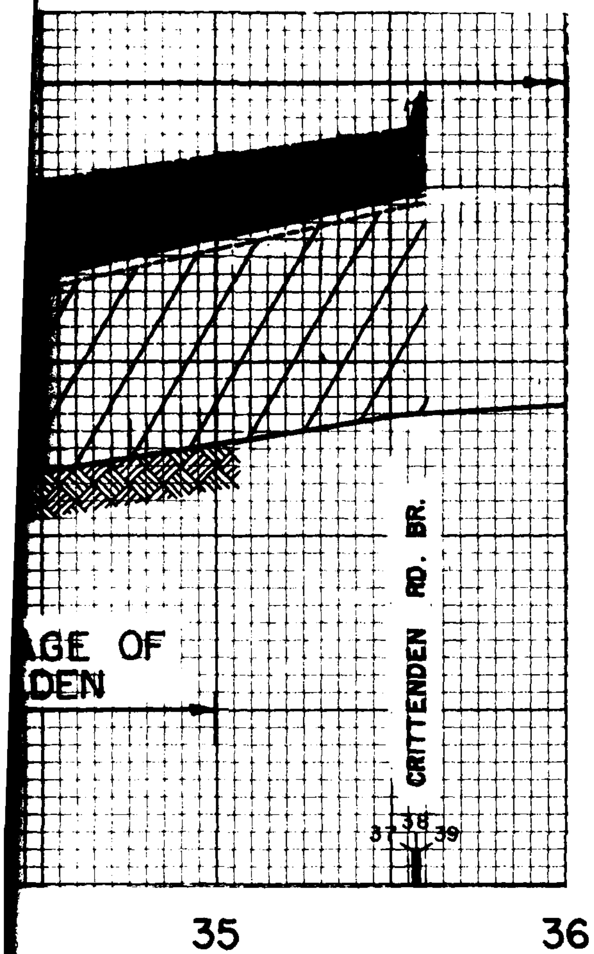


LEGEND:

△ THE LONGITUDINAL SECTION ELEVATIONS ARE BASED ON ACTUAL FIELD SURVEYS AND U.S. GEOLOGICAL QUADRANGLE MAPS.

□ ELEVATION OF BRIDGE SECTIONS ALSO ARE BASED ON FIELD SURVEYS AND U.S. GEOLOGICAL QUADRANGLE MAPS.

ELLICOTT CREEK
LANCASTER & ALDEN, NEW YORK
FLOOD PLAIN INFORMATION REPORT

**PROFILES**

**MILE 28.0 TO 36.0**

U S ARMY ENGINEER DISTRICT, BUFFALO
OCTOBER, 1972

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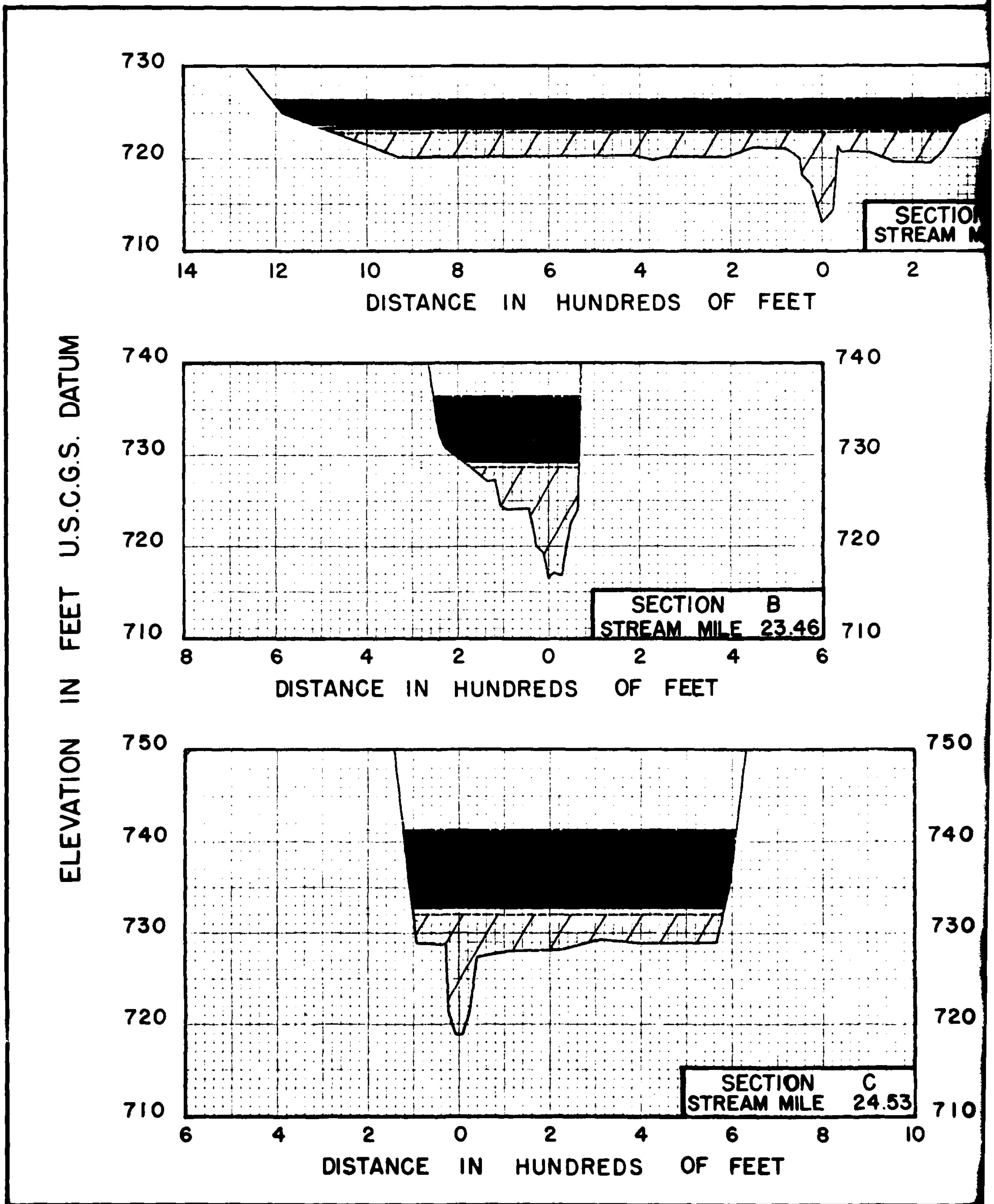
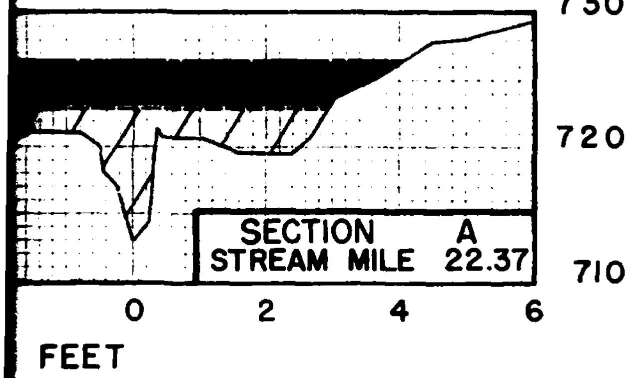
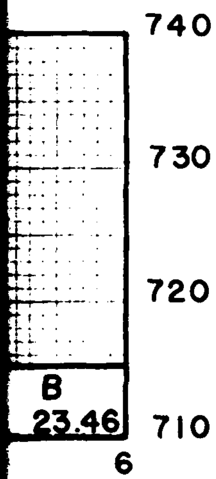
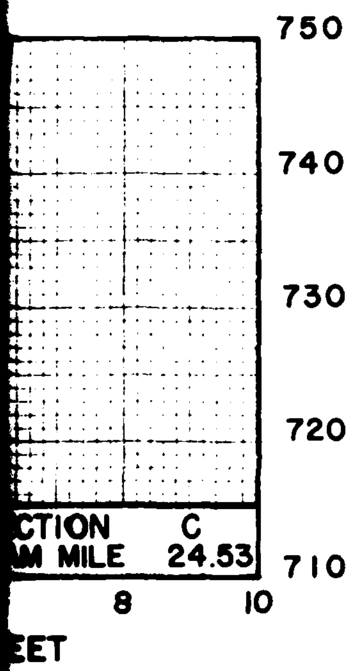
PLATE 5



ELEVATION IN FEET U.S.C.G.S. DATUM
730
720
710
14
12
10
8
6
4
2
0
2
SECTIO
STREAM M
DISTANCE IN HUNDREDS OF FEET
740
730
720
710
SECTION B
STREAM MILE 23.46
8
6
4
2
0
2
4
6
DISTANCE IN HUNDREDS OF FEET
750
740
730
720
710
SECTION C
STREAM MILE 24.53
6
4
2
0
2
4
6
8
10
DISTANCE IN HUNDREDS OF FEET




## LEGEND:

STANDARD PROJECT FLOOD
INTERMEDIATE REGIONAL FLOOD
50-YEAR FLOOD

## NOTES:

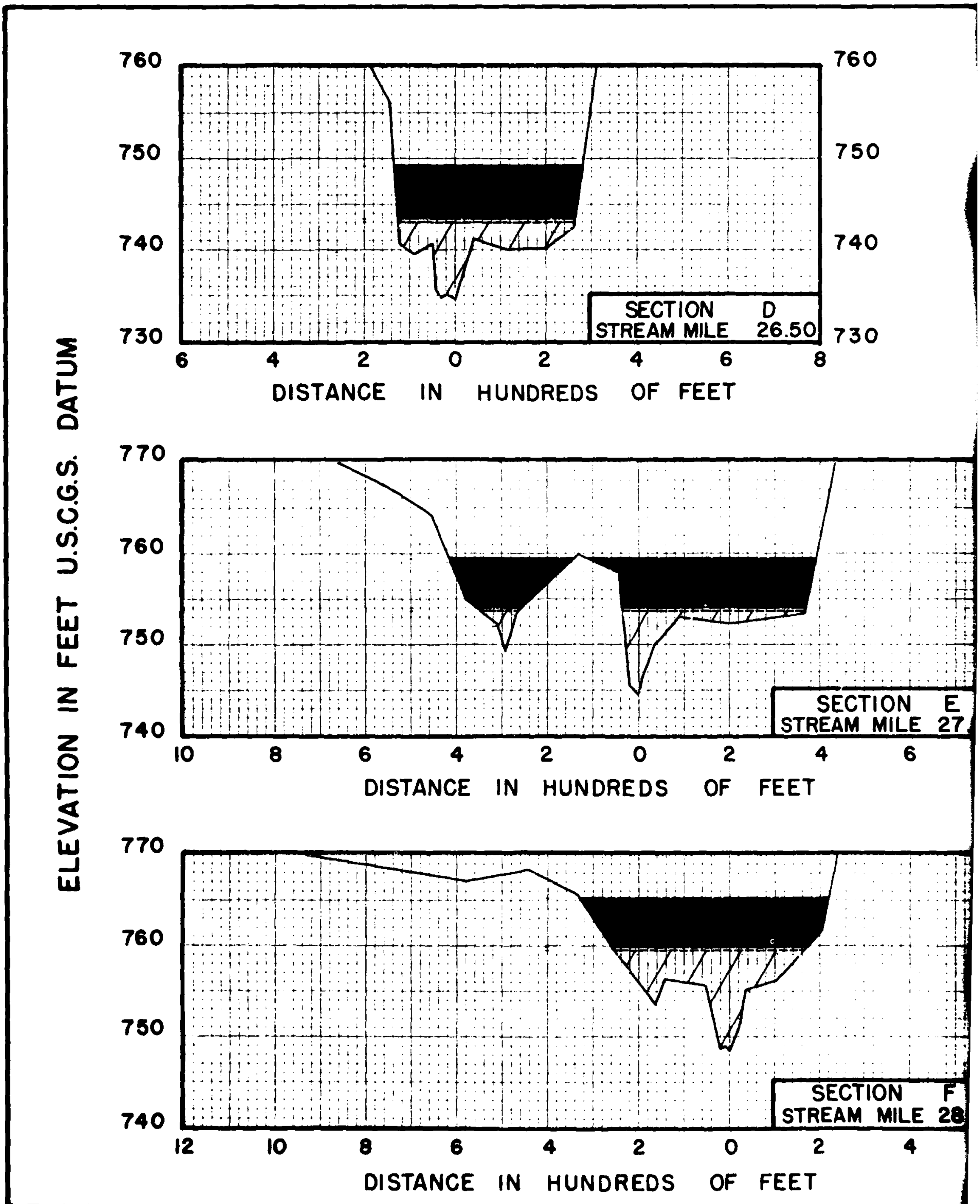
VALLEY CROSS SECTIONS ARE BASED ON ACTUAL FIELD SURVEYS AND U.S. GEOLOGICAL QUADRANGLE MAPS.

ELLICOTT CREEK
LANCASTER & ALDEN, NEW YORK
FLOOD PLAIN INFORMATION REPORT

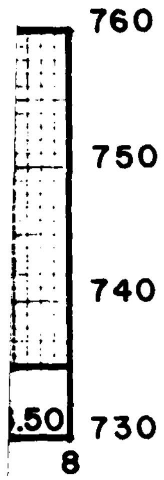
VALLEY CROSS SECTIONS
A, B, AND C

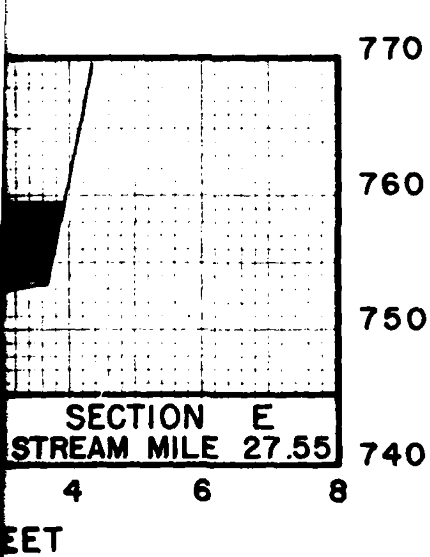
U.S. ARMY ENGINEER DISTRICT, BUFFALO
OCTOBER, 1972

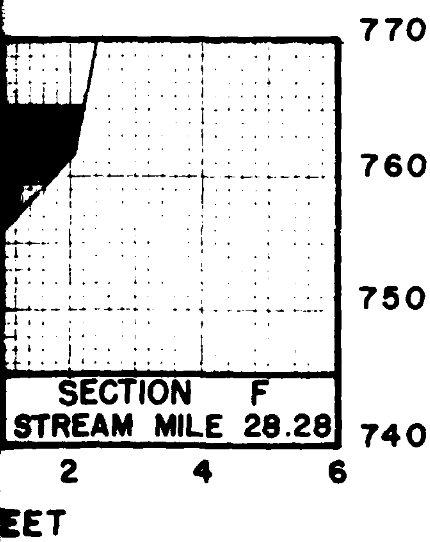
PLATE 6



ELEVATION IN FEET U.S.C.G.S. DATUM
SECTION D
STREAM MILE 26.50
DISTANCE IN HUNDREDS OF FEET
SECTION E
STREAM MILE 27
DISTANCE IN HUNDREDS OF FEET
SECTION F
STREAM MILE 28
DISTANCE IN HUNDREDS OF FEET




## LEGEND:

STANDARD PROJECT FLOOD
INTERMEDIATE REG. FLOOD
50-YEAR FLOOD

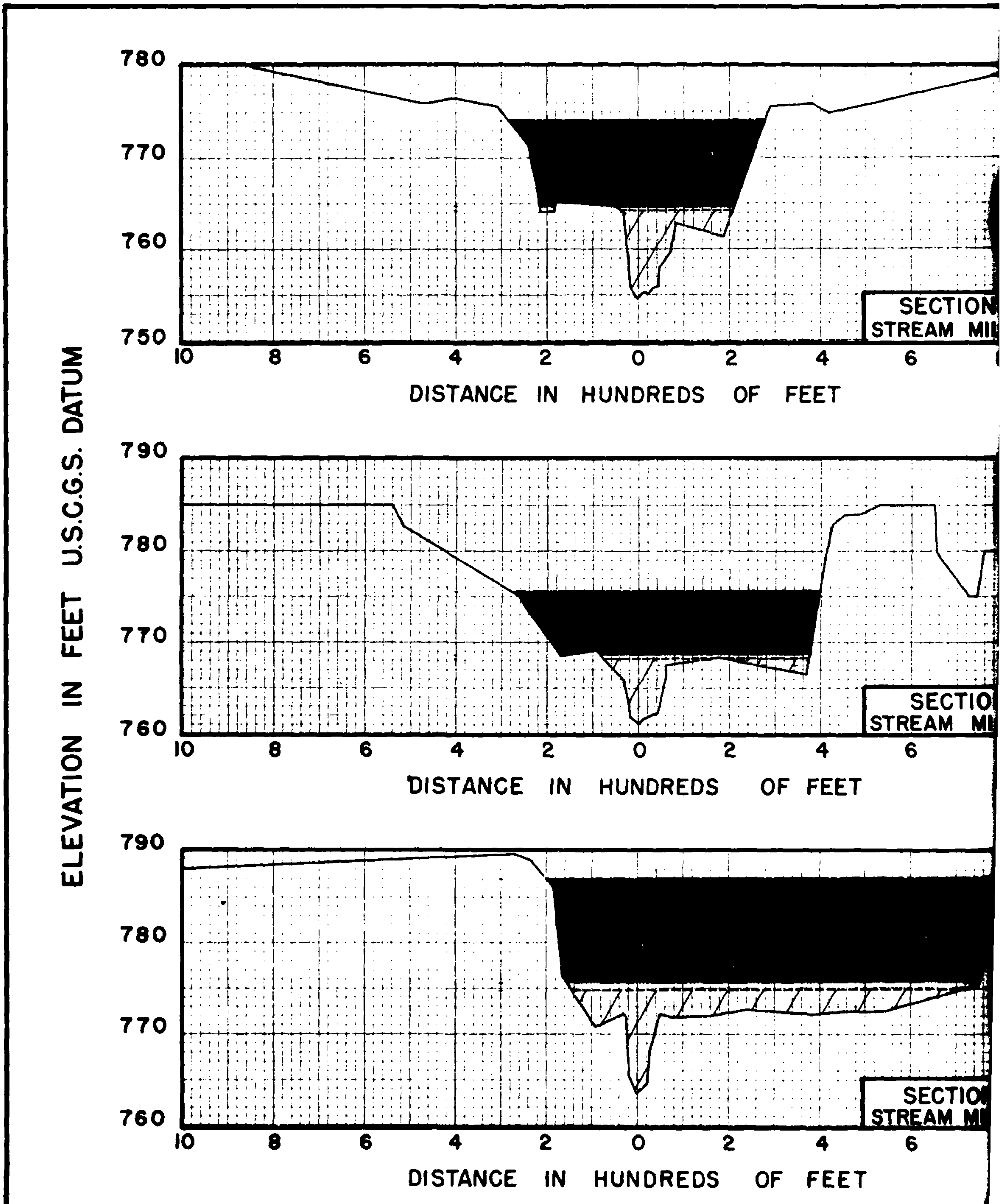
## NOTES :

VALLEY CROSS SECTIONS ARE BASED ON ACTUAL FIELD SURVEYS AND U.S. GEOLOGICAL QUADRANGLE MAPS.

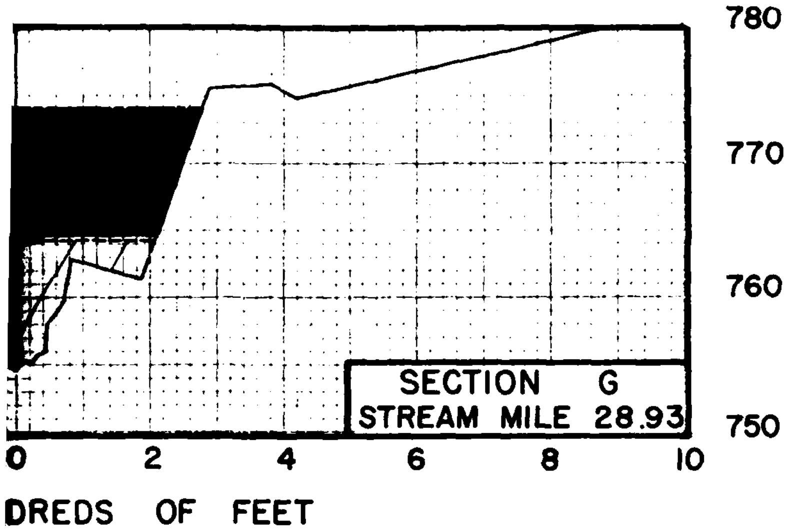
ELLICOTT CREEK
LANCASTER & ALDEN, NEW YORK
FLOOD PLAIN INFORMATION REPORT

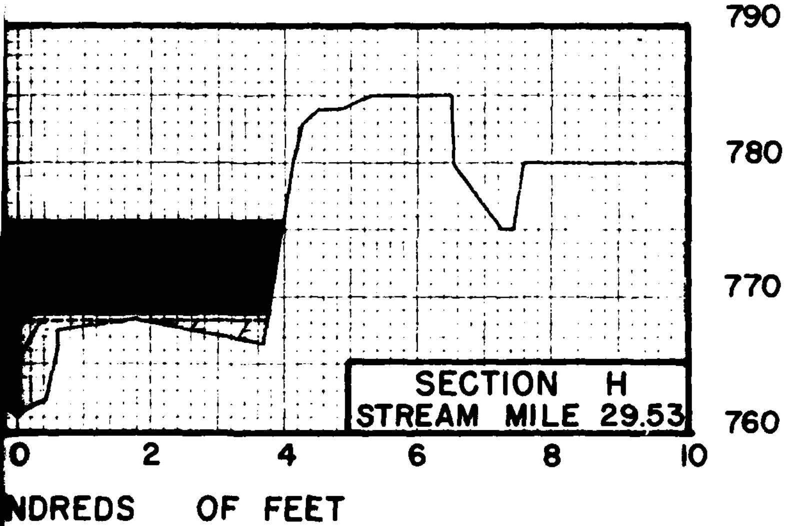
VALLEY CROSS SECTIONS
D, E, AND F

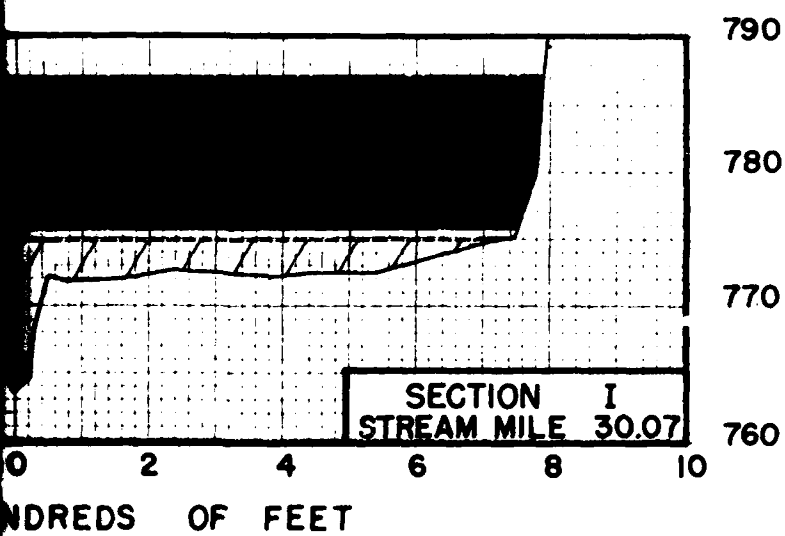
U. S. ARMY ENGINEER DISTRICT, BUFFALO
OCTOBER 1972



ELEVATION IN FEET U.S.C.G.S. DATUM
780
770
760
750
10
8
6
4
2
0
2
4
6
SECTION
STREAM MIL
DISTANCE IN HUNDREDS OF FEET
790
780
770
760
10
8
6
4
2
0
2
4
6
SECTIO
STREAM MI
DISTANCE IN HUNDREDS OF FEET
790
780
770
760
10
8
6
4
2
0
2
4
6
SECTIO
STREAM MI
DISTANCE IN HUNDREDS OF FEET




## LEGEND:

STANDARD PROJECT FLOOD
INTERMEDIATE REG. FLOOD
50 - YEAR FLOOD

## NOTES:

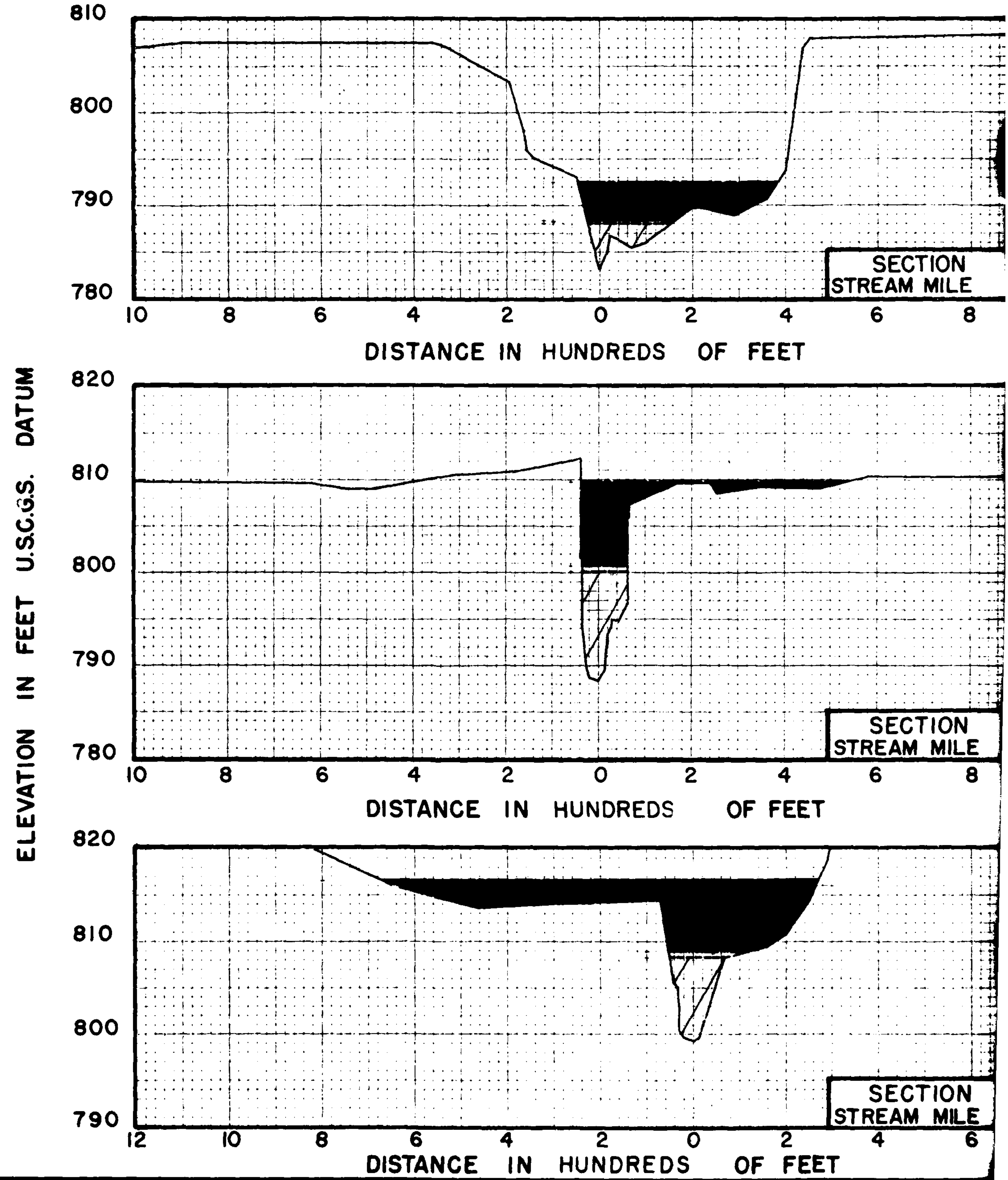
VALLEY CROSS SECTIONS ARE BASED ON ACTUAL FIELD SURVEYS AND U.S. GEOLOGICAL QUADRANGLE MAPS.

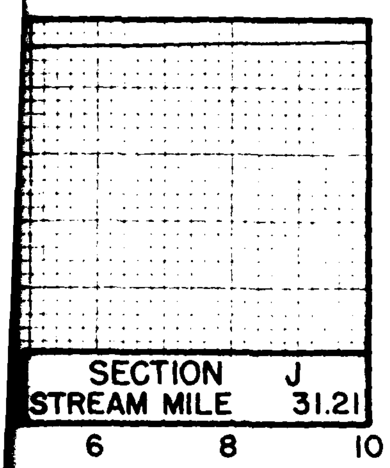
ELLICOTT CREEK
LANCASTER & ALDEN, NEW YORK
FLOOD PLAIN INFORMATION REPORT

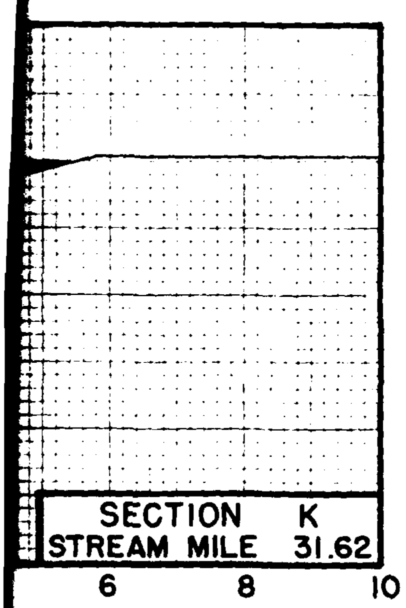
VALLEY CROSS SECTIONS
G, H, AND I

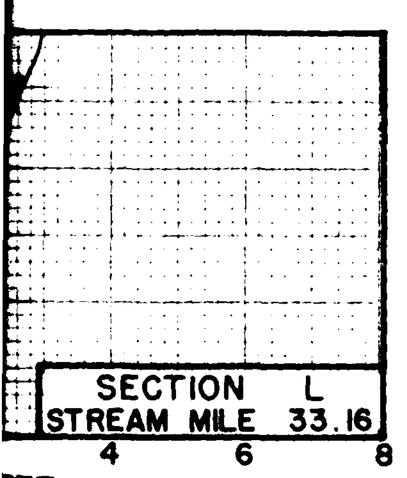
U.S. ARMY ENGINEER DISTRICT, BUFFALO
OCTOBER, 1972

PLATE 8


ELEVATION IN FEET U.S.C.G.S. DATUM
810
800
790
780
10
8
6
4
2
0
2
4
6
8
SECTION
STREAM MILE
DISTANCE IN HUNDREDS OF FEET
820
810
800
790
780
10
8
6
4
2
0
2
4
6
8
SECTION
STREAM MILE
DISTANCE IN HUNDREDS OF FEET
820
810
800
790
12
10
8
6
4
2
0
2
4
6
SECTION
STREAM MILE
DISTANCE IN HUNDREDS OF FEET




## LEGEND:

STANDARD PROJECT FLOOD
INTERMEDIATE REG. FLOOD
50 - YEAR FLOOD

## NOTES:

VALLEY CROSS SECTIONS ARE BASED ON ACTUAL FIELD SURVEYS AND U.S. GEOLOGICAL QUADRANGLE MAPS.

ELLICOTT CREEK
LANCASTER & ALDEN, NEW YORK
FLOOD PLAIN INFORMATION REPORT

VALLEY CROSS SECTIONS
J, K, AND L

U.S. ARMY ENGINEER DISTRICT, BUFFALO
OCTOBER, 1972

PLATE 9

DATE

FILMED

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